



**BALAS ROJAS**

**WORKSHOP MANUAL**  
**GP1 125-250 c.c.**





# INTRODUCTION

**DERBI - NACIONAL MOTOR, S.A.U.**, manufacturer of DERBI motorcycles and mopeds, has produced this manual with the aim of documenting and simplifying as much as possible the work you need to do to in dismantling and assembling the GP1 125/250 c.c.

The intention is to provide as much assistance as possible to mechanics working for our brand's dealers and sub-dealers.

Due to its constant commitment to improving its products, **DERBI - NACIONAL MOTOR, S.A.U.** Sociedad Unipersonal reserves the right to introduce any modifications it deems fit, without prior warning.

All the information included in this manual is based on the latest data available at the time of its publication. The drawings and photographs in this manual are for reference purposes only, and may therefore not be exactly the same as the corresponding parts of the current model itself.

**NACIONAL MOTOR, S.A.U.**



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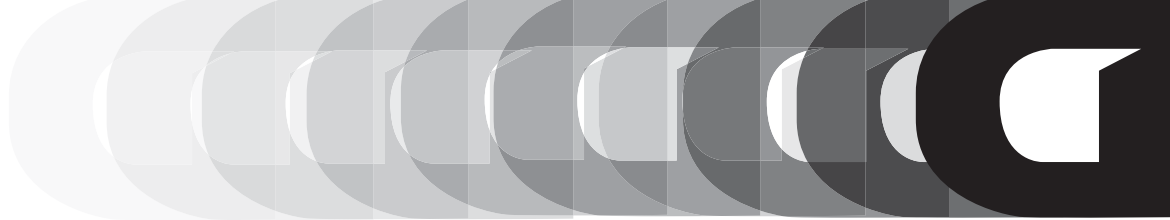
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# GENERAL INFORMATION

## **REGULATIONS**

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This section describes the machine's general safety and maintenance work rules.

## **SAFETY REGULATIONS**

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- In the event of having to carry out work on the engine while this is running, ensure that the area is well ventilated, where possible using extractor fans. Never leave engines running in closed spaces. Exhaust gases are poisonous.

Petrol is extremely inflammable and in certain conditions may explode. Smoking must not be allowed in the work area, nor should there be naked flames or sparks.

## **MAINTENANCE REGULATIONS**

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- Use genuine DERBI spare parts and lubricants recommended by the manufacturer. Non-genuine or unauthorised parts may damage the engine.

Always use new gaskets and oil seals during re-assembly.

After dismantling, clean the components with solvents that are non-inflammable or with a high flammability point. Lubricate all working surfaces before assembling, excluding tapered joints.

After assembly, check that all components have been correctly fitted and that they are functioning perfectly.

For dismantling, checking and assembly operations, use only tools with metric measurements. Metric screws, nuts and bolts are not interchangeable with imperial measurement joining devices. Using unsuitable tools and joining devices may damage the engine.

- In the case of work on the engine involving the electrical circuitry, check that electrical connections have been correctly fitted.

## **N.B.**

Indicates a note that gives key information to make the procedure easier and clearer.

## **ATTENTION**

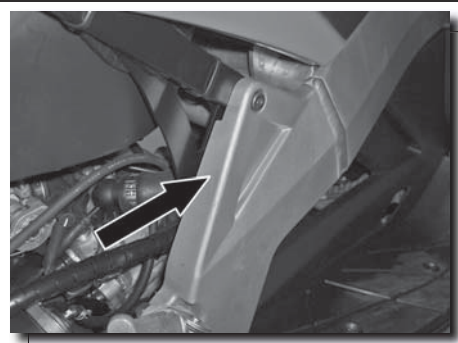
Indicates specific procedures that must be carried out to avoid damage to the machine.

## **WARNING**

Indicates specific procedures that must be followed to avoid possible accidents to the person repairing the machine.

# GENERAL TECHNICAL DATA

MACHINE	ENGINE PREFIX	FRAME PREFIX
GP1 125 c.c.	M434M	VTHPS1A1A
GP1 250 c.c.	M237M	VTHPT1A1A



## DIMENSIONS AND WEIGHT

SPECIFICATIONS	DESC. / QUANTITY
Maximum length	1930 mm.
Maximum height	1225 mm.
Length between axles	1375 mm.
Handlebar width	705 mm.
Handlebar height	1085 mm.

## ENGINE

SPECIFICATIONS	DESC. / QUANTITY
Engine type	Single cylinder four-stroke and four valve water-cooled
Timing	Single overhead cam driven by a chain on the left-hand side; rockers with three arms and with threaded adjuster.
Int. diameter per stroke (125)	57x 48,6mm
Int. diameter per stroke (250)	72 x 60 mm
Cubic capacity (125)	124,015 cm <sup>3</sup>
Cubic capacity (250)	244,290 cm <sup>3</sup>
Compression ratio (125)	12:1

# GENERAL TECHNICAL DATA

## ENGINE

SPECIFICATIONS	DESC. / QUANTITY
Compresion ratio (250)	10,5-11,5: 1
Keihin Carburettor (125 - 250)	CVEK-30
Walbro Carburettor (125)	WVF 7G* 0 29
Walbro Carburettor (250)	WVF-7S*
Idle speed	1650 $\pm$ 50 r.p.m.
Adjustment CO	3,8 $\pm$ 07
Air filter	Sponge-type damped eith a 50% for filters. Oil - 50% unleaded petrol misture
Starter system	Electric starter motor
Lubrication	Engine lubrication with geared twin-screw pump (inside the oil sump) coomanded by chain and double paper net filter.
Feeding	With depression pump and petrol through carburettor
Max. power (crankshaft) 125cc	11 kw (15CV) at 9700p.r.m.
Max. power (crankshaft) 250cc	16,18 Kw (22CV) at 8250 p.r.m.

## TRANSMISSION

SPECIFICATIONS	DESC. / QUANTITY
Transmission	Automatic expandable pulley varistor with servosystem, trapezoidal belt, self-ventilating dry automatic centrifugal clutch, gear reducer and transmission compartment with forced air circulation.

## CAPACITIES

SPECIFICATIONS	DESC. / QUANTITY
Engine oil (125)	~ 1100 cc
Engine oil (250)	~ 1200 cc
Fuel tank	~ 11 L. with reservation of 2,7 L.)
Rear hub oil	250 cc

# GENERAL TECHNICAL DATA

## ELECTRICAL SYSTEM

### ELECTRICAL COMPONENTS

SPECIFICATIONS	DESC. / QUANTITY
Ignition type	Electronic with capacitive discharge (CDI) and variable advance with separate HT coil.
Ignition advance (before T.D.C) 125	$10^{\circ} \pm 1^{\circ}$ at 2000 r.p.m. - $34^{\circ} \pm 1^{\circ}$ at 6000 r.p.m.
Ignition advance (before T.D.C)	$10^{\circ} \pm 1$ at 2000g/min. $28^{\circ} \pm 1$ at 6500 g/min.
Spark plug (125)	CHAMPION RG4HC
Spark plug (250)	CHAMPION RG4HC
Battery	12V-12Ah
Fuses	N°1 15A / N°2 15A / N°3 15A
Generator	AC current

## FRAME AND SUSPENSIONS

SPECIFICATIONS	DESC. / QUANTITY
Type	Aluminium alloy Delta Box type
Front suspension	Hydraulic telescopic fork with forward-shifted pin and $\varnothing$ 40 mm rods.
Front wheel max. travel	100 mm
Rear suspension	Engine functioning as swingarm pivoting on frame through arm with two degrees of freedom. Pair of double-acting hydraulic shock absorbers and coaxial springs with preload adjustment.
Max. rear shock absorber travel	90/85 mm

## BRAKES

SPECIFICATIONS	DESC. / QUANTITY
Brakes front	$\varnothing$ 245 mm disc with hydraulically operated dual piston floating caliper (lever at right end of handlebar).
Brakes rear	$\varnothing$ 240 disc with hydraulically operated dual opposed piston caliper (lever at left end of handlebar).



# GENERAL TECHNICAL DATA

## WHEELS AND TYRES

SPECIFICATIONS	DESC. / QUANTITY
Front wheel rim	Aluminium alloy
Rear wheel rim	In light alloy
Front tyre	120 / 70 x 14"
Rear tyre	120 / 60 x 14"
Tyre pressure front wheel (cold)	1,9 bar
Tyre pressure rear wheel (cold)	2,0 bar
Tyre pressure rear/front wheel (driver and passenger). (cold)	2,0 / 2.2 bar

### N.B.

CHECK AND ADJUST TYRE PRESSURE WITH TYRES AT AMBIENT TEMPERATURE. ADJUST PRESSURE ACCORDING TO THE WEIGHT OF THE RIDER AND ACCESSORIES.

## SECONDARY AIR

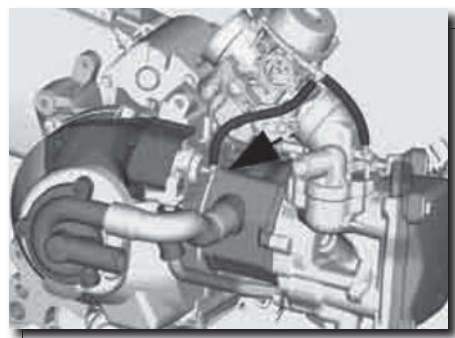
The working principle of the SAS for Leader 125 cc engines is entirely similar to the SAS employed on 2-stroke engines.

### The main differences are the following:

Secondary air enters directly into the exhaust duct on the cylinder head, instead of entering through the exhaust pipe as in two-stroke engines.

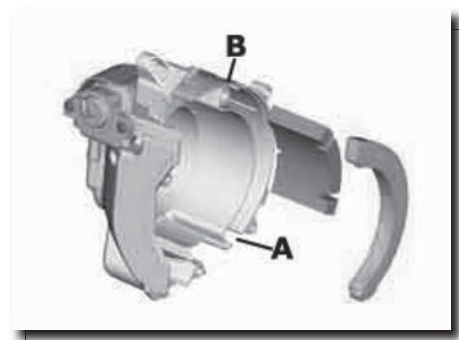
The reed valve found on 2-stroke engines is here replaced by a membrane. The unit, indicated by an arrow in the figure, is provided with a cut-off connected to the vacuum inlet on the intake manifold to shut air intake during deceleration, so to prevent detonations in the silencer.

Air is sucked in through hole «A» and flowing through the first filter is directed towards hole «B».

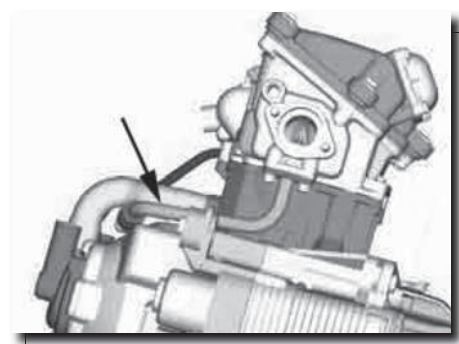
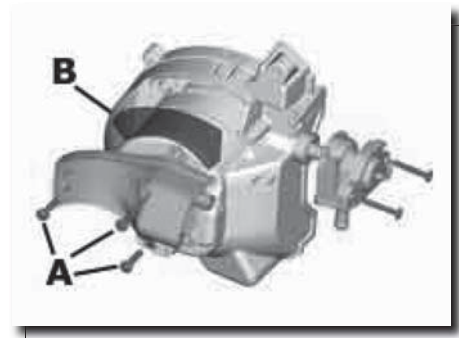


## GENERAL TECHNICAL DATA

Flowing through the hole shown in the figure, the air reaches the second filter, «B». At this point, the filtered air enters the membrane device, so to be channelled towards the head.



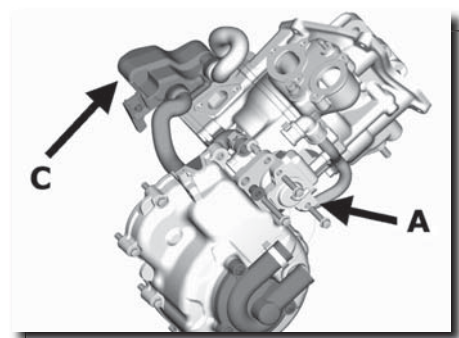
Flowing through a rigid pipe, flanged to the head, the secondary air reaches the exhaust duct thus providing oxygen addition to the unburnt gases just before they enter the catalytic converter. The efficiency of the catalyzing process is therefore increased.



El sistema de funcionamiento del SAS para motor Quasar 250 Euro 2 es totalmente similar al funcionamiento del sistema SAS para motor 2T.

### Las diferencias son las siguientes:

El aire secundario, en vez de entrar en el silenciador, como sucede para el 2T entra directamente en el conducto de descarga sobre la culata.



## GENERAL TECHNICAL DATA

The working principle of the SAS for Quasar 250 cc Euro 2 engines is entirely similar to the SAS employed on 2-stroke engines. The main differences are the following:

Secondary air enters directly into the exhaust duct on the cylinder head, instead of entering through the exhaust pipe as in two-stroke engines.

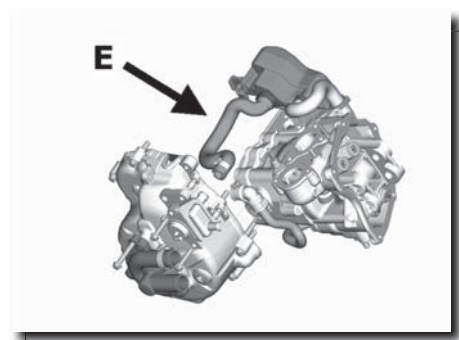
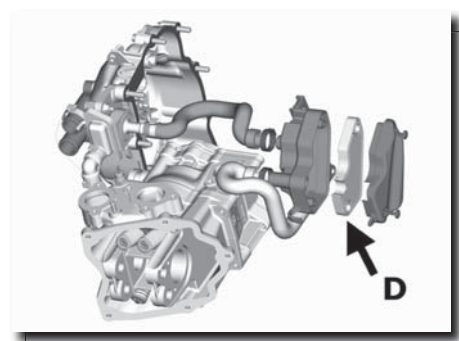
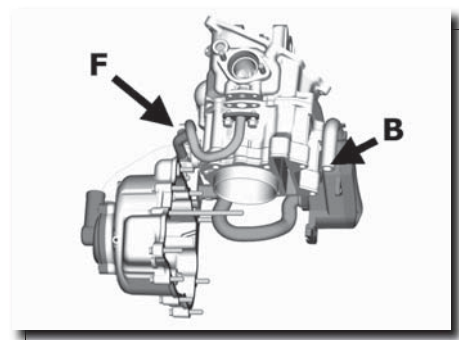
The reed valve found on 2-stroke engines is here replaced by a membrane.

Unit «A», shown in the figure, is provided with a cut-off connected to the vacuum inlet on the intake manifold to shut air inlet during deceleration, so to prevent detonations in the silencer. Air is sucked in through hole «B» and flows inside the duct into air-box «C» where it is filtered by filtering element «D».

The filtered air now enters membrane device «A», through duct «E» and is then guided towards the head.

Flowing through pipe «F», flanged to the head, secondary air reaches the exhaust duct thus providing oxygen addition to the unburnt gases just before they enter the catalytic converter.

The efficiency of the catalyzing process is therefore increased.



# GENERAL TECHNICAL DATA

## CARBURATTOR HEIHIN

### Version 125

SPECIFICATION	DESC. / QUANTITY
Depresione type	CVEK30
Printing on the body	CVK
Device CUT-OFF	Not present
Max. jet	105
Minimum jet	35
Max. air jet	70
Minimum air jet	130
Idle mixture adjustment screw initial opening	2 ±1/4
Conical pin	Ø 2,450
Emulsifier nozzle	Ø 2,8
Starter air jet	Ø 1,5
Starter jet	42
Starter device resistance	~20 Ω
Venturi choke	Ø 29
Throttle valve	Ø 30,5
Choke maximum cone	Ø 47

## CARBURETTOR WALBRO

SPECIFICATION	DESC. / QUANTITY
Type to depression	WVF-7G*
Printing on the body	7G
Device CUT-OFF	Not present
Max jet	108
Minimum jet	36
Max air jet.	115
Minimum air jet	100
Gas valve spring	100 gr
Idle mixture adjustment screw initial opening	2 5/8 ± 1/2
Conical pin printing	51C
Conical pin notches position from top	2
Emulsifier nozzle	Ø 2,7
Choke máximo cone	Ø 1,5
Starter air jet	200
Starter emulsifier jet	130

# GENERAL TECHNICAL DATA

## CARBURADOR WALBRO

SPECIFICATION	DESC. / QUANTITY
Starter jet	50
Starter pin diameter	Ø 1,78
Starter device resistance	~ 40Q
Choke	Ø 29 (30,3x27,0)
Throttle valve	Ø 33
Choke maximum cone	Ø 48,0

## CARBURATTOR HEIHIN

### Version 250

SPECIFICATION	DESC. / QUANTITY
Depression type	CVEK30
Printing on the body	CVK
CUT-OFF device	Present
Max jet	100
Minimum jet	38
Max air jet	70
Minimum air jet	115
Idle mixture adjustment screw initial opening	2½ ± ¼
Conical pin	Ø 2,530
Emulsifier nozzle	Ø 2,8
Starter air jet	Ø 1,5
Starter jet	42
Starter device resistance	~ 20 □
Venturi choke	Ø 29
Throttle valve	Ø 30,5
Choke maximum cone	Ø 47

# GENERAL TECHNICAL DATA

## CARBURATTOR WALBRO

### Version 250

SPECIFICATION	DESC. / QUANTITY
Depression type	WVF-7S*
Printing on the body	7S
CUT-OFF device	Presente
Max jet	118
Minimum jet	34
Max air jet	150
Mínimum air jet	31
Gas valve spring	120 gr
Idle mixture adjustment screw initial opening	3±½
Conical pin	465
Tacche dall'alto spillo cónico	3
Emulsifier nozzle	Ø 2,7
Choke máximo cone	Ø 1,5
Starter air jet	200
Starter emulsifier jet	130
Starter jet	50
Starter pin diameter	Ø 1,78
Starter device resistance	~ 40Ω
Choke	Ø 29 (30,3x27,0)
Throttle valve	Ø 33
Choke máximo cone	Ø 48,0

\* The identification letter can vary every time the carburettor is updated.

# GENERAL TECHNICAL DATA

## CHASSIS TIGHTENING TORQUES

DESCRIPTION	TORQUES (N.M)	TORQUES (M.KG)	SEALER
M8X125 8.8 FRONT FRAME-CHASSIS SECUR.DEVICE	1,7÷1,9	17÷19	
M8X125 8.8 SUBCHASSIS-CHASSIS SEC.DEVICE	1,7÷1,9	17÷19	
M10x150 12.9 TOP SHOCK ABSOR.-CHASSIS SEC.DEVICE	4,5÷5,5	45÷55	
M10x150 12.9 BOTTOM SHOCK ABSOR.-ENG. SEC.DEV.	4,5÷5,5	45÷55	
M14x200 8.8 FRONT ENG. SUPPORT-CHASSIS SEC.DEV.	7÷8	70÷80	
M10X150 8.8 REAR ENG.SUPP-FRONT ENG.SUPP. SEC.DEV.	3÷4	30÷40	
M10X150 8.8 ENGINE-REAR SUPP. SEC.DEV.	3÷4	30÷40	
M8X125 8.8 ENGINE SUPP. SILENTBLOC CLAMP SEC.DEV.	1,7÷1,9	17÷19	
M8X125 8.8 SHOCK ABSORBER SUPP. SEC.DEV.	1,7÷1,9	17÷19	
M8X125 12.9 SHOCK ABSOR. SUPP. TO CRANKCASE SEC.DEV.	3÷3,5	30÷35	
M12X175 12.9 SHOCK ABSORBER SUPP. TO SUSP. ARM SEC.DEV. M12X175 12.9	6÷6,5	60÷65	
M30,5X150 FORKS FLANGE SEC.DEV.	9÷13	90÷130	
M6x100 HORN-CHASSIS SEC.DEV.	0,8÷1	8 ÷ 10	
M10X150 8.8 STAND SEC.DEV.	3÷4	30÷40	
M8Z125 8.8 FOOTREST SUPPORT-CHASSIS SEC.DEV.	1,7÷1,9	17÷19	
M7x100 8.8 EXHAUST PIPE-CYLINDER SEC.DEV.	1÷1,3	10÷13	
M8X125 8.8 SILENCER-SUSPENSION ARM SEC.DEV.	1,7÷1,9	17÷19	•
M6x100 8.8 STEERING LOCK-CHASSIS SEC.DEV.	0,8÷1	8÷10	
M8x125 8.8 HANNDLEBARS-STEERING FORKS SEC. DEV.	1,7÷1,9	17÷19	
M8x125 8.8 HANDLEBAR CLAMP SEC.DEV.	1,7÷1,9	17÷19	
M5x80 8.8 COUNTERWEIGHT-HANDLEBAR SEC.DEV.	0,35÷0,45	3,5÷4,5	
M14x150 FRONT WHEEL-FORKS SEC.DEV.	7÷8	70÷80	
M8x125 FORK ARM LOCK SEC.DEV.	1,5÷1,9	15÷19	
M6x100 10.9 BRAKE DISK-FRONT WHEEL SEC.DEV.	1÷1,2	10÷12	•
M10x150 8.8 FR. BRAKE CALLIPER-FORKS SEC.DEV.	3,5÷4	35÷40	•
M8X125 12.9 SUSP. ARM-ENGINE SEC. DEV.	2,2÷2,5	22÷25	•
M16X125 10.9 REAR HUB-ENGINE SEC.DEV.	11,5÷12,5	115÷125	
M8X40 10.9 REAR WHEEL-HUB SEC.DEV.	2,7÷2,9	27÷29	•
M8X125 8.8 REAR CALLIPER SUPP.-CRANKCASE SEC.DEV.	1,7÷1,9	17÷19	•
M8X125 8.8 REAR CALLIPER-CALLIPER SUPP. SEC.DEV.	1,7÷1,9	17÷19	•
M6x100 10.9 BRAKE DISK-REAR HUB SEC. DEV.	1÷1,2	10÷12	
M8x125 8.8 CLAMP-CHASSIS SEC.DEV.	1,7÷1,9	17÷19	
M6x100 RADIATOR-CHASSIS SEC.DEV.	0,8÷1	8÷10	
THERMOSTAT SWITCH-RADIADOR SEC.DEV.	1,7÷2,2	17÷22	
M5X80 8.8 ELECT.FAN-CHASSIS SEC.DEV.	0,4÷0,5	4÷5	
M5x80 VARIOUS METAL PARTS TO CHASSIS SEC.DEV	0,35÷0,45	3,5÷4,5	
M6x100 VARIOUS METAL PARTS TO CHASSIS SEC.DEV.	0,8÷1	8÷10	
M8x125 VARIOUS METAL PARTS TO CHASSIS SEC.DEV.	1,5÷1,9	15÷19	
M5x80 VARIOUS PLASTIC PARTS TO CHASSIS SEC.DEV.	0,1÷0,2	1÷2	
M6x100 VARIOUS PLASTIC PARTS TO CHASSIS SEC.DEV.	0,2÷0,35	2÷3,5	

(•) Sellador the thread type locktite 243

# GENERAL TECHNICAL DATA

## EXHAUST PIPE

NAME	TORQUE IN Nm
Screw clamping manifold to silencer	15,5 ÷ 18,5
Screw clamping heat shield to silencer	5 ÷ 6
Exhaust gas intake screw	22 ÷ 26
Screw fixing silencer support arm to crankcase	33 ÷ 41
Exhaust pipe/support bracket fixing screw.	27 ÷ 30
Exhaust pipe/cylinder head fixing nut.	16 ÷ 18

## ENGINE - LUBRICATION

NAME	TORQUE IN Nm
Hub oil/exhaust cap	15 ÷ 17
Oil filter union on crankcase	27 ÷ 33
Engine oil / net filter drainage cap	24 ÷ 30
Oil filter	4 ÷ 6
Oil pump cover screws	0,7 ÷ 0,9
Screws fixing the oil pump to the crankcase	5 ÷ 6
Oil pump control rim screw	10 ÷ 14
Oil pump cover plate screws	4 ÷ 6
Oil sump screws	10 ÷ 14
Minimum oil pressure sensor	12 ÷ 14

## CYLINDER HEAD

NAME	TORQUE IN Nm
Spark plug	12 ÷ 14
Cylinder head cover screw (1) (A)	9 ÷ 11 + 180°
Head fastening side screws	11 ÷ 13
Start up mass screws	7 ÷ 8,5
M5 side screw fastening washers on cam shaft (125 cc)	7 ÷ 8,5



# GENERAL TECHNICAL DATA

## CYLINDER HEAD

NAME	TORQUE IN Nm
Tappet adjustment lock nut	6 ÷ 8
Timing chain tightener sliding block screws	10 ÷ 14
Start up mass bell screws	11 ÷ 15
M6 central screw fastening washers on cam shaft (125 cc)	11 ÷ 15
Timing belt tightener support screw	11 ÷ 13
Timing belt tightener central screw	5 ÷ 6
Camshaft retain plate screw	4 ÷ 6

## TRANSMISSION

NAME	TORQUE IN Nm
Belt support roller screw	11 ÷ 13
Clutch assembly nut on driven pulley	45 ÷ 50
Driving pulley screw	75 ÷ 83
Transmission cover screw	11 ÷ 13 Nm
Driven pulley axis	54 ÷ 60
Hub cover screws	24 ÷ 27

## FLYWHEEL

NAME	TORQUE IN Nm
Flywheel cover fastening	5 ÷ 6
Stator cover screws (°)	3 ÷ 4
Flywheel nut (125)	52 ÷ 58
Flywheel nut (250)	94 ÷ 102
Pick-Up fixing screws	3 ÷ 4
Free wheel fixing screws on the flywheel	13 ÷ 15

# GENERAL TECHNICAL DATA

## ENGINE CRANKCASE AND SHAFT

NAME	TORQUE IN Nm
Engine crankcase inside head screws (transmission side half shaft)	4 ÷ 6
Engine crankcase coupling screws	11 ÷ 13
Starter motor screws	11 ÷ 13
Crankcase timing cover screws	3,5 ÷ 4,5

## COOLING

NAME	TORQUE IN Nm
Water pump impeller cover	3 ÷ 4
Water pump impeller drive joint screw	3 ÷ 4
Thermostat cover screws	3 ÷ 4

(°) Apply threadlocking LOCTITE médium, type 242.

(\*) Tighten the two screws after tightening the rear wheel spindle nut with the prescribed torque.

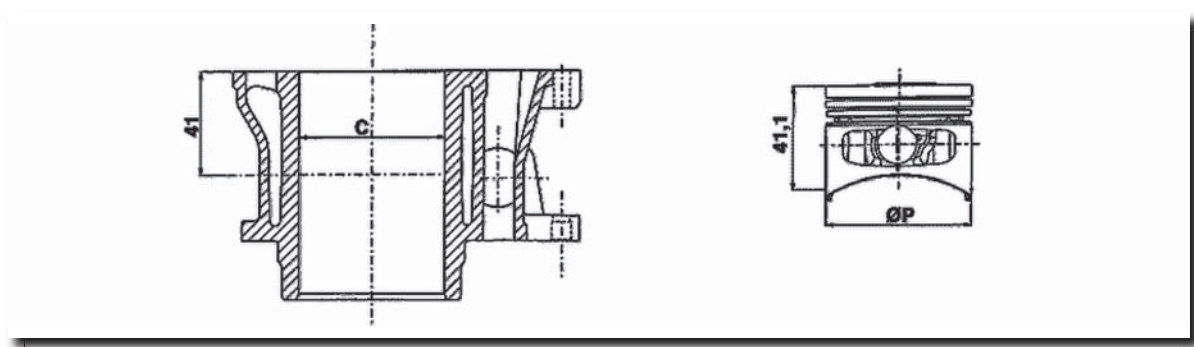
(A) Tighten the nuts in two phases, following a crosswise pattern.

(1) Lubricate nuts with engine oil before fitting.

# GENERAL TECHNICAL DATA

## OVERHAUL DATA

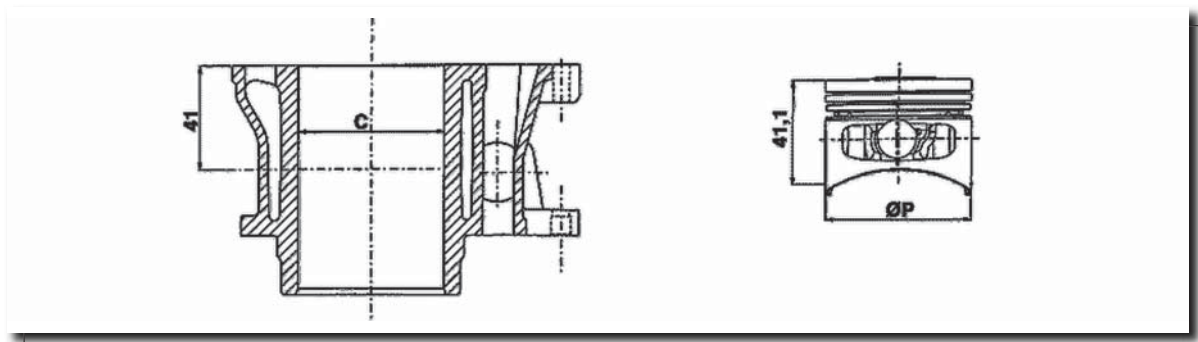
### ASSEMBLY CLEARANCES CYLINDER - PISTON ASSY



### CATEGORIES COUPLING 125

NAME	PLAY	INITIALS	CYLINDER	PISTON	PLAY ON FITTING
Cylinder	$57+0,025\pm0,003$	A	$56,997 \div 57,004$	$56,945 \div 56,952$	0,045-0,059
Cylinder	$57+0,025\pm0,003$	B	$57,004 \div 57,011$	$56,952 \div 56,959$	0,045-0,059
Piston	$56,959\pm0,014$	C	$57,011 \div 57,018$	$56,959 \div 56,966$	0,045-0,059
Piston	$56,959\pm0,014$	D	$57,018 \div 57,025$	$56,966 \div 56,973$	0,045-0,059
Cylinder first uprat.	$57,2+0,025\pm0,003$	A1	$57,197 \div 57,204$	$57,145 \div 57,152$	0,045-0,059
Cylinder first uprat.	$57,2+0,025\pm0,003$	B1	$57,204 \div 57,211$	$57,152 \div 57,159$	0,045-0,059
Piston first uprat.	$57,159\pm0,014$	C1	$57,211 \div 57,218$	$57,159 \div 57,166$	0,045-0,059
Piston first uprat.	$57,159\pm0,014$	D1	$57,218 \div 57,225$	$57,166 \div 57,173$	0,045-0,059
Cylinder second uprat.	$57,4+0,025\pm0,003$	A2	$57,397 \div 57,404$	$57,345 \div 57,352$	0,045-0,059
Cylinder second uprat.	$57,4+0,025\pm0,003$	B2	$57,404 \div 57,411$	$57,352 \div 57,359$	0,045-0,059
Piston second uprat.	$57,359\pm0,014$	C2	$57,411 \div 57,418$	$57,411 \div 57,418$	0,045-0,059
Piston second uprat.	$57,359\pm0,014$	D2	$57,418 \div 57,425$	$57,366 \div 57,373$	0,045-0,059
Cylinder third uprat.	$57,6+0,025\pm0,003$	A2	$57,597 \div 57,604$	$57,545 \div 57,552$	0,045-0,059
Cylinder third uprat.	$57,6+0,025\pm0,003$	B3	$57,604 \div 57,611$	$57,552 \div 57,559$	0,045-0,059
Piston third uprat.	$57,559\pm0,014$	3C	$57,611 \div 57,618$	$57,559 \div 57,566$	0,045-0,059
Piston third uprat.	$57,559\pm0,014$	D3	$57,618 \div 57,625$	$57,566 \div 57,573$	0,045-0,059

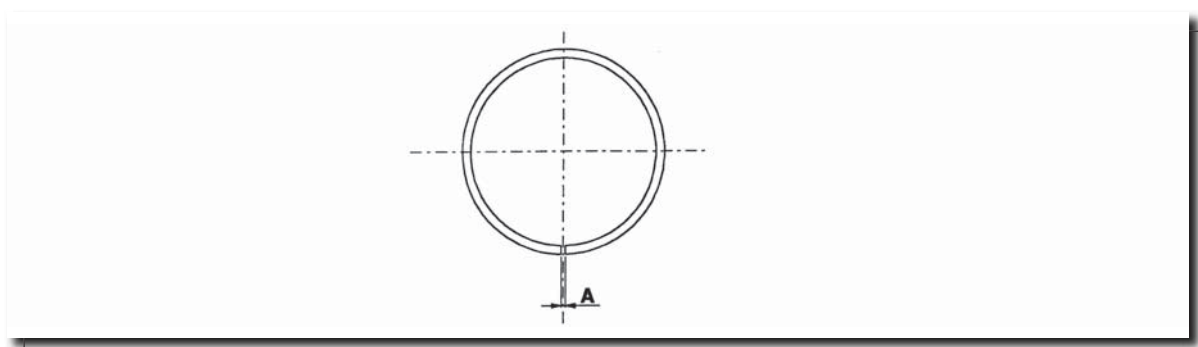
# GENERAL TECHNICAL DATA



## COUPLING CATEGORIES ENGINE 250

NAME	PLAY	INITIAL	CYLINDER	PISTON	PLAY ON FITTING
Cylinder	$72+0,018\pm0,010$	A	$71,990 \div 71,997$	$71,953 \div 71,960$	0,030-0,044
Cylinder	$72+0,018\pm0,010$	B	$71,997 \div 72,004$	$71,960 \div 71,967$	0,030-0,044
Piston	$71,967\pm0,014$	C	$72,004 \div 72,011$	$71,967 \div 71,974$	0,030-0,044
Piston	$71,967\pm0,014$	D	$72,011 \div 72,018$	$71,974 \div 71,981$	0,030-0,044

## PISTON RINGS



## UPRATING TABLE ENGINE 125

NAME	DESCRIPTION	DIMENSIONS	INITIALS	QUANTITY
Compression lining		57 x 1	A	$0,15 \div 0,30$
Scraper ring lining		57 x 1	A	$0,10 \div 0,30$
Scraper ring lining		57 x 2,5	A	$0,15 \div 0,35$

# GENERAL TECHNICAL DATA

## OVERSIZES ENGINE 250

NAME	DESCRIPTION	DIMENSIONS	INITIALS	QUANTITY
Compression lining		72 x 1,5	A	0,15 ÷ 0,30
Scraper ring lining		72 x 1	A	0,20 ÷ 0,40
Scraper ring lining		72 x 2,5	A	0,20 ÷ 0,40

## CRANKCASE - CRANKSHAFT - CONNECTING ROD

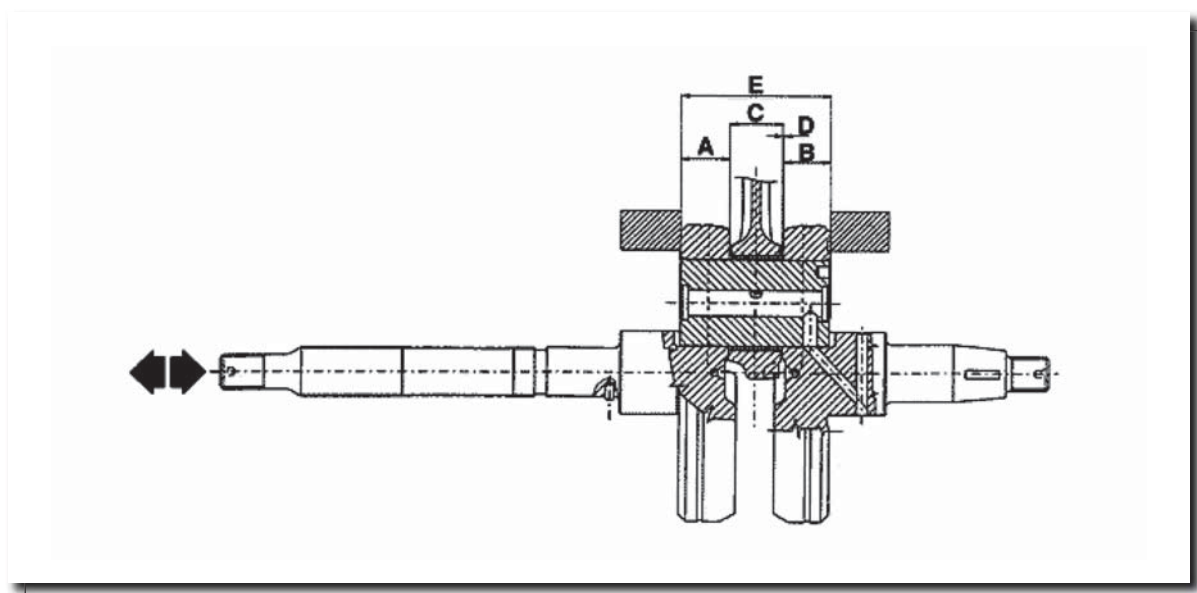
### CRANKCASE - DRIVING SHAFT - BENCH HALF BEARING

NAME	DESCRIPTION	DIMENSIONS	INITIALS	QUANTITY
Half crankshaft bearing			Type A - red	1,970 ÷ 1,973
Half crankshaft bearing			Type B - blue	1,973 ÷ 1,976
Half crankshaft bearing			Type C - yellow	1,976 ÷ 1,979
Crankshaft cat. 1 - Crankcase cat. 1			C - C	
Crankshaft cat. 1 - Crankcase cat. 2			B - B	
Crankshaft cat. 2 - Crankcase cat. 1			B - B	
Crankshaft cat. 2 - Crankcase cat. 2			A - A	
Crankshaft			Category 1	28,998 ÷ 29,004
Crankshaft			Category 2	29,004 ÷ 29,010
Carter			Category 1	32,959 ÷ 32,965
Carter			Category 2	32,953 ÷ 32,959

# GENERAL TECHNICAL DATA

## FITTING CLEARANCE

**Driving shaft/case axial clearance:** Standard clearance  $0,15 \div 0,40\text{mm}$  (cold engine).



## CARNCSHAFT - CRANKCASE AXIAL CLEARANCE/CARTER

NAME	DESCRIPTION	DIMENSIONS	INITIALS	QUANTITY
Half shaft transmission side		$16,6+0-0,05$	A	$D = 0,20 \div 0,50$
Half shaft flywheel side		$16,6+0-0,05$	B	$D = 0,20 \div 0,50$
Conecting rod		$18-0,10-0,15$	C	$D = 0,20 \div 0,50$
Spacing tool		$51,4+0,05$	D	$D = 0,20 \div 0,50$

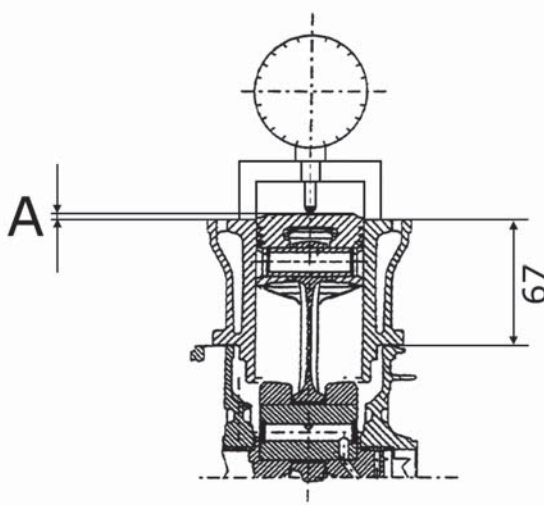
# GENERAL TECHNICAL DATA

## SLOT PACKING SYSTEM

### Characteristics

Compression ratio - 125cc version

Rc: 11,50÷13:1



The length «A» to be measured refers to the piston protrusion. It indicates the amount by which the surface formed by the piston crown tops the surface formed by the upper part of the cylinder. The more the piston descends into the cylinder, the less the base gasket to be applied (to recover the compression ratio) will be and vice versa.

### N.B.

THE MEASUREMENT OF «A» MUST BE CARRIED WITH THE PISTÓN AT THE TDC, WITHOUT ANY GASKET INSTALLED BETWEEN THE CRANKCASE AND THE CYLINDER, AND AFTER RESETTNG THE COMPARATOR, COMPLETE WITH SUPPORT, ON A RECTIFIED SURFACE.

## 125CC VERSIÓN WITH FIBRE HEAD GASKET (1.1)

NAME	MEASURE A	THICKNESS
Thicknesses 125	2,20÷2,45	0,4 ± 0,05
Thicknesses 125	2,45÷2,70	0,6 ± 0,05

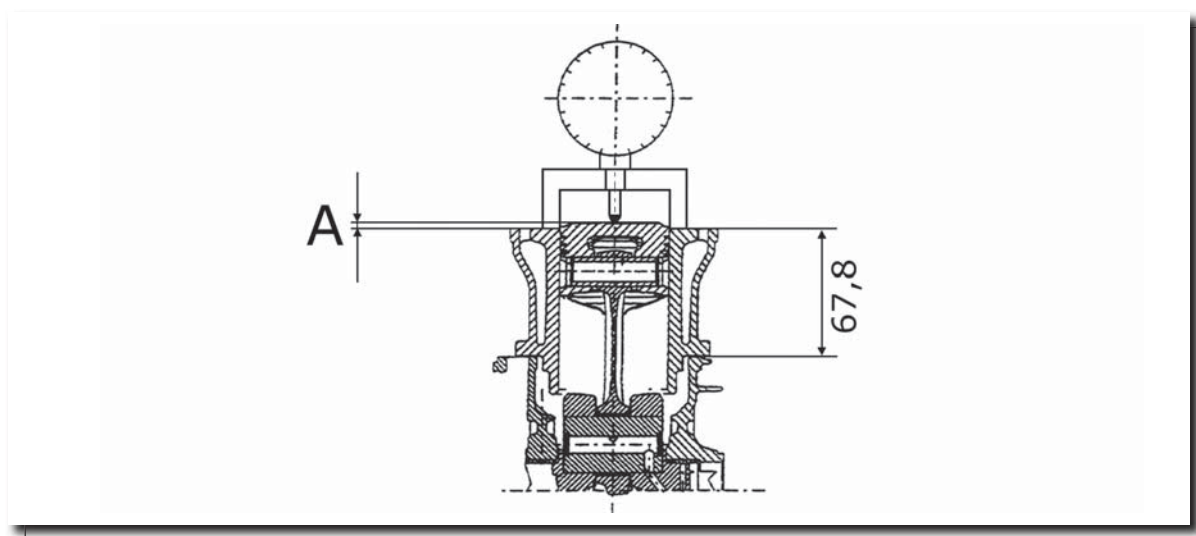
# GENERAL TECHNICAL DATA

## SLOT PACKING SYSTEM

### Characteristics

Compression ratio - 125cc version

Re: 11,50÷13:1



The length «A» to be measured refers to the pistón protrusion. It indicates the amount by which the surface formed by the pistón crown tops the surface formed by the upper part of the cylinder. The more the pistón descends into the cylinder, the less the base gasket to be applied (to recover the compression ratio) will be and vice versa.

### N.B.

THE MEASUREMENT OF «A» MUST BE CARRIED WITH THE PISTÓN AT THE TDC, WITHOUT ANY GASKET INSTALLED BETWEEN THE CRANKCASE AND THE CYLINDER, AND AFTER RESETTNG THE COMPARATOR, COMPLETE WITH SUPPORT, ON A RECTIFIED SURFACE.

## 125CC VERSIÓN WITH METALLIC HEAD GASKET (0.3)

NAME	MEASURE A	THICKNESS
Thicknesses 125	1,40÷1,65	0,4 ± 0,05
Thicknesses 125	1,65 ÷1,90	0,6 ± 0,05



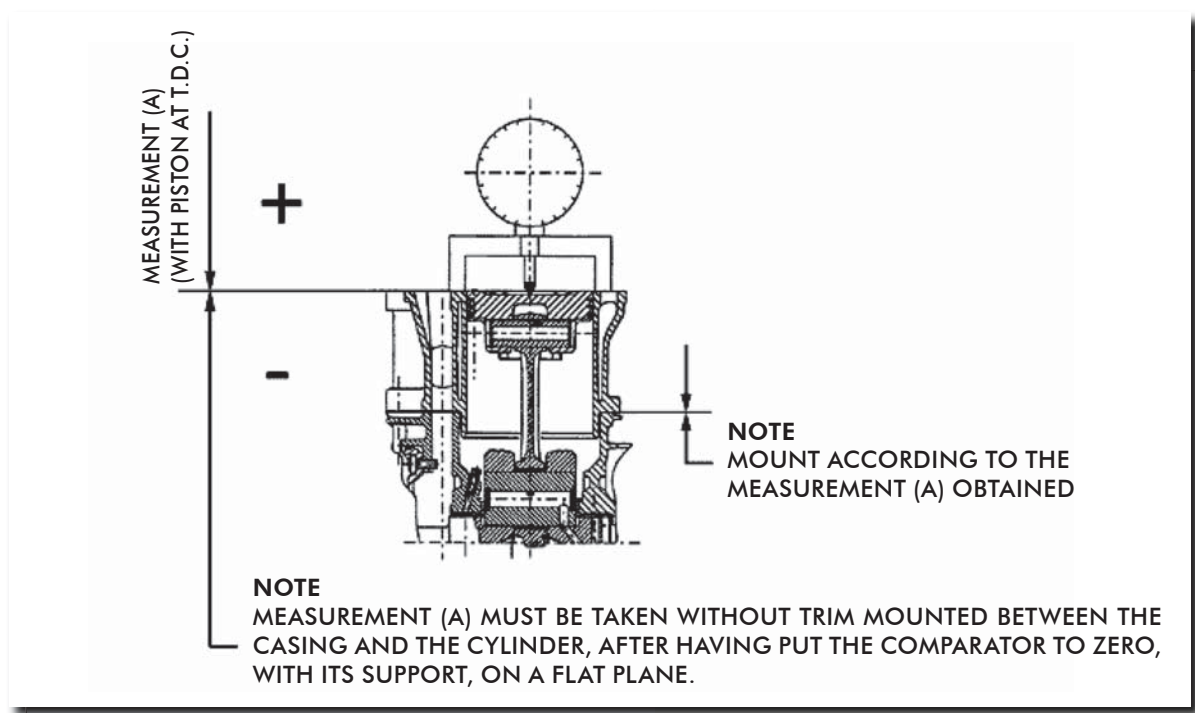
# GENERAL TECHNICAL DATA

## SISTEMA DE MONTAJE DE ESPESORES

### Características Técnicas

Relación de compresión versión 250

Re: 10,5-11,5



### N.B.

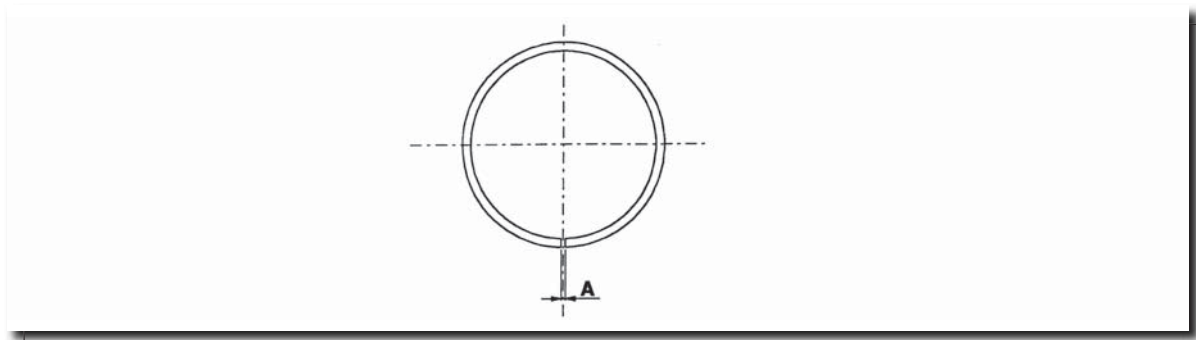
THE MEASURE «A» TO TAKE IS A PISTÓN PROTRUSION VALUÉ THAT INDICATES HOW MUCH THE PLAÑE FORMED BY THE PISTÓN TOP PROTRUDES FROM THE PLAÑE FORMED BY THE TOP OF THE CYLINDER. THE MORE THE PISTÓN PROTRUDES FROM THE CYLINDER, THE MORE THE BASE GASKET TO APPLY (TO RECOVER THE COMPRESSION RATIO) AND VICE VERSA.

## SHIMMING 250

NAME	MEASURE A	THICKNESS
Shimming 250	2,60÷2,50	0,4 ± 0,05
Shimming 250	2,50÷2,30	0,6 ± 0,05
Shimming 250	2,30÷2,20	0,8 ± 0,05

# GENERAL TECHNICAL DATA

## OVERSIZES



## OVERSIZES ENGINE

NAME	DESCRIPTION	DIMENSION	INITIALS	QUANTITY
Compression lining 1° greater		57,2 x 1	A	0,15 ÷ 0,30
First uprated scraper ring lining		57,2 x 1	A	0,10 ÷ 0,30
First uprated scraper ring lining		57,2x2,5	A	0,15 ÷ 0,35
Second uprated compression lining		57,4 x 1	A	0,15 ÷ 0,30
Second uprated scraper ring lining		57,4 x 1	A	0,10 ÷ 0,30
Second uprated scraper ring lining		57,4 x 2,5	A	0,15 ÷ 0,35
Third uprated compression lining		57,6 x 1	A	0,15 ÷ 0,30
Third uprated scraper ring lining		57,6 x 1	A	0,10 ÷ 0,30
Third uprated scraper ring lining		57,6 x 2,5	A	0,15 ÷ 0,35

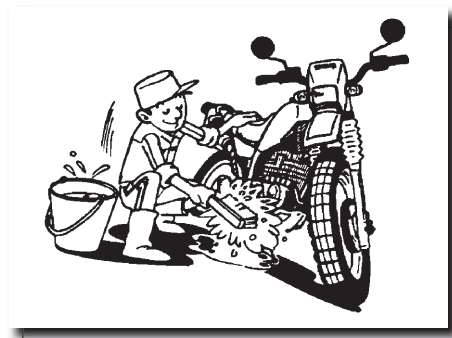
## RECOMENDEDS PRODUCTS

DESCRIPTION	SPECIFICATIONS
Rear hub oil	Oil SAE 80W/90 of higher quality than API GL3 Specifications
Air filter sponge oil	Mineral oil with specific additives to increase adhesion ISO VG
Complex calcium soap grease NLGI 1-2	Grease (brake command levers, Gas)
Engine oil	Synthetic oil SAE 5W/40 of higher quality than API SJ Specifications
Brake fluid	Synthetic fluid SAE J1703, NHTSA 116 DOT 4, ISO 4925
Cooling fluid	Mono-ethylene glycol based anti-freeze, CUNA NC 956-16 fluid
Grease for driven pulley shaft compensating ring and mobile driven pulley sliding seat	Molybdenum bisulphide grease
Grease for steering wheel bearings and pin seats	Lithium soap and zinc oxide grease NLGI2 for the oscillating arm
Oil for four stroke engines	Oil for flexible transmission lubrication (gas control)

# RECOMMENDED TOOLS

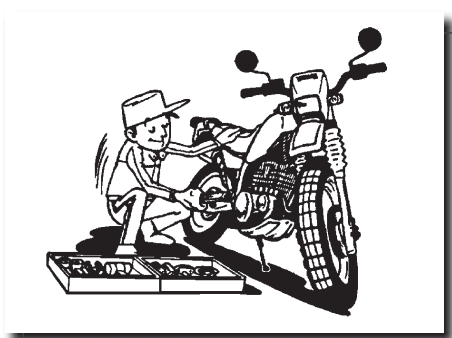
## PPREPARATION FOR REMOVAL AND DISMANTLING

1. Remove all the dirt, grime, dust and other foreign material before removing and dismantling.



2. Use properly cleaned tools and equipment.

See "**SPECIAL TOOLS**".



3. On dismantling the motorcycle, always keep paired parts together. This includes gears, cylinders, pistons and other parts submitted to natural wear in pairs. Paired parts must always be reassembled or replaced together.



4. While dismantling the motorcycle, clean all the parts and lay them out on trays in the order dismantled. This speeds up reassembly and ensures the correct fitting of all the parts.

5. Keep all parts away from any contact with fire.



# RECOMMENDED TOOLS

## REPLACEMENT PARTS

1. Use only genuine **DERBI** spare parts. For all lubrication tasks use oils and greases recommended by **DERBI**. Other makes may seem similar in their function and appearance, but are inferior in quality.

## SEALS, RETAINING RINGS AND O-RINGS

1. Replace all seals, retaining rings and O-rings when servicing the engine.  
All surfaces receiving seals, retaining ring edges and O-rings must be cleaned.

2. Apply oil to all paired parts and bearing during reassembly. Apply grease to the retaining ring edges.

## TAB/SPACER WASHERS AND SPLIT PINS

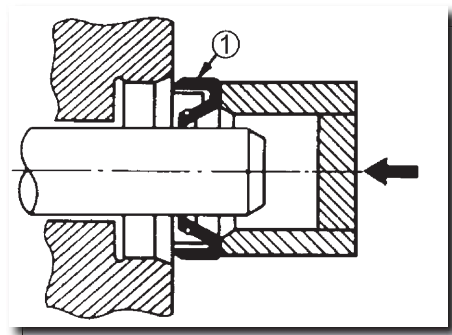
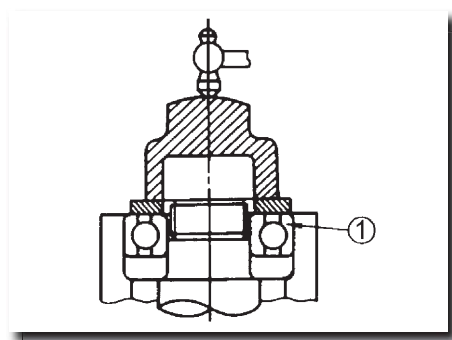
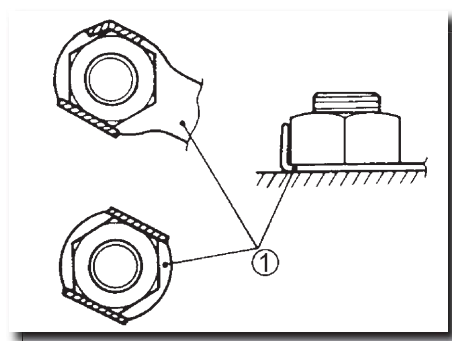
1. After removing them, replace all tab/spacer washers (1) and split pins. Bend the tabs to fit the flat surfaces of the bolt or nut once they have been tightened to the specified torque.

## BEARINGS AND RETAINING RINGS

1. Fit bearings and retaining rings in such a way that the manufacturers marks remain visible. On fitting retaining rings, applying a thin film of light lithium soap based grease to their edges. Where required, apply oil generously when fitting bearings.

### WARNING

DO NOT USE COMPRESSED AIR TO DRY BEARINGS. THIS DAMAGES THE BEARING SURFACES.

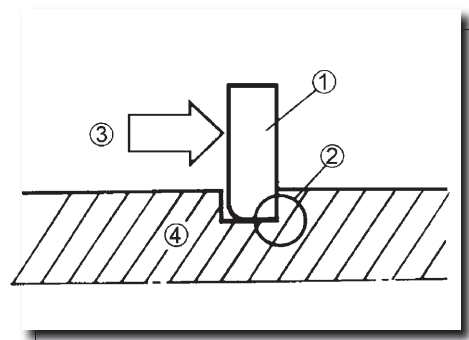


# RECOMMENDED TOOLS

## LOCKING RINGS



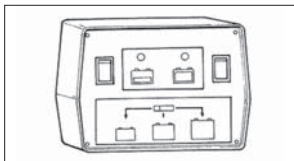


1. Examine all the locking rings carefully before fitting. Always replace the gudgeon pin circlips after every use. Replace distorted locking rings. On fitting a locking ring (1), ensure that the sharp edge (2) is on the opposite side to the force to be applied to it.

See the figure on the side, (4) Axle.






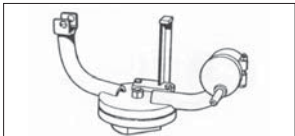




## SPECIAL TOOLS







1. The following special tools are needed for assembly and for complete and exact adjustments. Only use the proper special tools; thereby avoiding damage caused by the use of unsuitable tools or improvised techniques.

STORES CODE	DESCRIPTION	IMAGE
020151Y	Air heater	
020331Y	Digital multimeter	
020333Y	Single battery charger	
020334Y	Multiple battery charger	
001467Y014	15 mm pliers	









# RECOMMENDED TOOLS

STORES CODE	DESCRIPTION	IMAGE
020412Y	15mm guide	
020335Y	Magnetic stand and comparator	
020565Y	Compass flywheel stop spanner	
020439Y	17mm guide	
020359Y	42 x 47mm hub bearing fitting adaptor	
020363Y	20mm guide	
002095Y	Engine support	
008564Y	Flywheel extractor	
020434Y	Oil pressure gauge connection	

# RECOMMENDED TOOLS

STORES CODE	DESCRIPTION	IMAGE
020382Y011	Bushing (valve remover)	
020424Y	Driven pulley roller casing drift	
020431Y	Valve oil seal extractor	
020193Y	Oil pressure gauge	
020306Y	Valve sealing ring drift	
020360Y	52 x 55mm adaptor	
020364Y	25mm guide	
020375Y	Adapter 28 x 30mm	



# RECOMMENDED TOOLS

STORES CODE	DESCRIPTION	IMAGE
020376Y	Handle for punches	
020444Y	Driven half pulley spring compressor tool	
020330Y	Stroboscopic gun for two-and four-stroke engines	
001467Y035	Bell	
020368Y	Driving pulley stop wrench	
020319Y	Immobilizer control test	
020287Y	Piston band clamps (engine 125 c.c)	
020263Y	Protective sheath	



















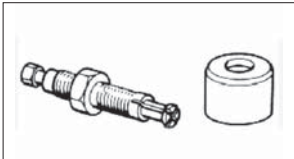
# RECOMMENDED TOOLS

STORES CODE	DESCRIPTION	IMAGE
020262Y	Crankcase detachment plate	
020430Y	Pin retainers installation tool (engine 125cc)	
020428Y	Piston position check support	
020426Y	Piston fitting fork	
020425Y	Flywheel-side oil guard punch	
020423Y	Driven pulley stop key	
020414Y	28 mm guide - Hub bearing assembly	
020393Y	Piston band clamps (Engine 200-250cc)	

# RECOMMENDED TOOLS

STORES CODE	DESCRIPTION	IMAGE
020382Y	Tool for removing valve cotters equipped with part 012	
020455Y	10mm guide	
020442Y	Pulley stop wrench	
020440Y	Water pump overhaul tool	
020329Y	Pump	
020357Y	32 x 35 mm adaptor	
020409Y	Multimeter adpater (Peak voltage measurement)	
020456Y	Ø 24mm adaptor	

# RECOMMENDED TOOLS

STORES CODE	DESCRIPTION	IMAGE
020332Y	Digital rpm counter	
020074Y	Crankshaft aligning tool	
002465Y	Pliers dor snap rings	
020454Y	Pin retainers installation tool	
020622Y	Transmission-side oil guard punch	
020444Y011	Adapter ring	
020444Y009	45 x 55 wrench	
001467Y	Bell	

# RECOMMENDED TOOLS

STORES CODE	DESCRIPTION	IMAGE
001467Y013	15mm pliers	
020444Y008	Adapter ring	
020244Y	Drift Ø 15	
020115Y	Drift Ø 18	
020271Y	Slient-block installation / removal tool	
020627Y	Flywheel stop key	
020467Y	Flywheel extractor	
020626Y	Driving pulley stop key	

# PERIODIC MAINTENANCE

## MAINTENANCE CHART

EVERY 3000 KM	
ACTION	

Engine Oil	Level Check/Top up
------------	--------------------

EVERY 2 YEARS	
ACTION	

Cooling Fluid	Replacement
Brake fluid	Change

Secondary air filter (external - internal) - Cleaning (125)

AT 1.000 KM OR 4 MONTHS	
ACTION	

Engine oil	Replacement
Hub Oil	Replacement
Oil filter	Replacement
Idling speed	Adjustment
Acceleration command	Adjustment
Steering	Adjust
Brake levers	Grease
Brake pads	Check condition + wear
Brake fluid level	Check
Nuts, bolts and fasteners	Check
Electrical system and battery	Check
Tires-inflation and wear	Check
Vehicle and brake test	Road test

AT 6.000 KM OR 12 MONTHS	
ACTION	

Engine oil	Replacement (125)
Hub oil level	Check
Spark Plug/Electrodes distance	Check
Air Filter	Cleaning
Oil filter	Replacement (125)
125 cc Valve Play	Check
Roller support sliding blocks / Varistor rollers	Check

# PERIODIC MAINTENANCE

AT 6.000 KM OR 12 MONTHS	
ACTION	
Transmission Belt	Check
Cooling fluid level	Check
Brake pads	Check condition + wear
Brake fluid level	Check
Electrical system and battery	Check
Tires-inflation and wear	Check
Vehicle and brake test	Road test

AT 12.000 KM OR 24 MONTHS AND 60.000 KM	
ACTION	
Engine oil	Replacement
Hub oil level	Check
Spark plug/Electrode gap	Check/Change
Air Filter	Cleaning
Oil filter	Replacement
Idling speed S&	Adjustment
Roller support sliding blocks / Varistor rollers	Change
Acceleration command	Adjustment
Cooling fluid level	Check
Steering	Adjust
Brake levers	Grease
Brake pads	Check condition + wear
Brake fluid level	Check
Transmissions	Lubricate
Nuts, bolts and fasteners	Check
Suspensions	Check
Electrical system and battery	Check
Headlight	Adjust
Tires-inflation and wear	Check
Vehicle and brake test	Road test
Transmission Belt (125 cc)	Replacement
Transmission Belt	Check (250)

# PERIODIC MAINTENANCE

AT 18.000 KM AND 54.000 KM	
ACTION	
Engine oil	Replacement (125)
Hub oil level	Check
Spark Plug/Electrodes distance	Check
Air Filter	Cleaning
Oil filter	Replacement (125)
125 cc Valve Play	Check
250 cc Valve Play	Check
Roller support sliding blocks / Varistor rollers	Check
Cooling fluid level	Check
Radiator	External cleaning/Check
Brake pads	Check condition + wear
Brake fluid level	Check
Electrical system and battery	Check
Tires-inflation and wear	Check
Vehicle and brake test	Road test
Secondary air filter (250)	Cleaning
Transmission Belt	Replacement (250)
Transmission Belt (125 cc)	Replacement

AT 24.000 KM AND 48.000 KM	
ACTION	
Engine oil	Replacement
Hub Oil	Replacement
Spark plug/Electrode gap	Check/Change
Air Filter	Cleaning
Oil filter	Replacement
Idling speed	Adjustment
Roller support sliding blocks / Varistor rollers	Change
Acceleration command	Adjustment
Cooling fluid level	Check
Steering	Adjust
Brake levers	Grease
Brake pads	Check condition + wear
Brake fluid level	Check
Transmissions	Lubricate
Nuts, bolts and fasteners	Check
Suspensions	Check

# PERIODIC MAINTENANCE

AT 24.000 KM AND 48.000 KM	
ACTION	

Electrical system and battery	Check
Headlight	Adjust
Tires-inflation and wear	Check
' Vehicle and brake test	Road test
Transmission Belt	Check (250)

AT 30.000 KM. 42.000 KM AND 66.000 KM	
ACTION	

Hub oil level	Check
Spark Plug/Electrodes distance	Check
Air Filter	Cleaning
Varistor rollers	Check or Replacement
Transmission Belt	Check
Cooling fluid level	Check
Brake pads	Check condition + wear
Brake fluid level	Check
Electrical system and battery	Check
Tires-inflation and wear	Check
Vehicle and brake test	Road test
Engine oil	Replacement (125)
Oil filter	Replacement (125)

AT 36.000 KM	
ACTION	

Engine oil	Replacement
Hub oil level	Check
Spark plug/Electrode gap	Check/Change
Air Filter	Cleaning
Oil filter	Replacement
125 cc Valve Play	Check
250 cc Valve Play	Check
Idling speed	Adjustment
Roller support sliding blocks / Varistor rollers	Change
Acceleration command	Adjustment
Transmission Belt	Replacemen



# PERIODIC MAINTENANCE

AT 36.000 KM	
ACTION	
Cooling fluid level	Check
Radiator	External cleaning/Check
Steering	Adjust
Brake levers	Grease
Brake pads	Check condition + wear
Flexible brake lines	Change
Brake fluid level	Check
Transmissions	Lubricate
Nuts, bolts and fasteners	Check
Suspensions	Check
Electrical system and battery	Check
Headlight	Adjust
Tires-inflation and wear	Check
Secondary air filter (250)	Cleaning
Vehicle and brake test	Road test

AT 72.000 KM	
ACTION	
Engine oil	Replacement
Hub Oil	Replacement
Spark plug/Electrode gap	Check / Change
Air Filter	Cleaning
Oil filter	Replacement
125 cc Valve Play	Check
250 cc Valve Play	Check
Idling speed	Adjustment
Roller support sliding blocks /Varistor rollers	Change
Acceleration command	Adjustment
Transmission Belt	Replacemen
Cooling fluid level	Check
Radiator	External cleaning/Check
Steering	Adjust
Brake levers	Grease
Brake pads	Check condition + wear
Flexible brake lines	Change
Brake fluid level	Check



# PERIODIC MAINTENANCE

AT 72.000 KM	
ACTION	
Transmissions	Lubricate
Nuts, bolts and fasteners	Check
Suspensions	Check
Electrical system and battery	Check
Headlight	Adjust
Tires-inflation and wear	Check
Secondary air filter (250)	Cleaning
Vehicle and brake test	Road test

# PERIODIC MAINTENANCE

	1000 km - 2 Monthse	6000 km - 12 Monthse	12000 km - 24 Monthse	18000 km - 36 Monthse	24000 km	30000 km	36000 km	42000 km	48000 km	54000 km	60000 km	66000 km	72000 km
<b>ENGINE OIL</b>	Check level / top up every 3000 km												
<b>ENGINE OIL 125 C.C.</b>													
<b>ENGINE OIL 250 C.C.</b>													
<b>HUB OIL LEVER</b>													
<b>DRIVE BELT 125 C.C.</b>													
<b>DRIVE BELT 250 C.C.</b>													
<b>TRANSMISSION</b>													
<b>OIL FILTER 125 C.C.</b>													
<b>OIL FILTER 250 C.C.</b>													
<b>AIR FILTER</b>													
<b>SECONDARY OIL FILTER 125 C.C.</b>	Check every 2 years												
<b>SECONDARY OIL FILTER 250 C.C.</b>													
<b>SPARK PLUG / ELECTRODE GAP</b>													
<b>ELECTRICAL SYSTEM AND BATTERY</b>													
<b>VALVE CLEARANCE</b>													
<b>WHEEL BEARINGS</b>													
<b>IDLE SPEED / FUEL – AIR MIXTURE</b>													
<b>THROTTLE CONTROL</b>													
<b>STEERING</b>													
<b>BRAKE LEVERS</b>													
<b>BRAKE PADS/SHOES</b>													
<b>BRAKE FLUID</b>	Replace every 2 years												
<b>LEVEL BRAKE FLUID</b>													
<b>FLEXIBLE BRAKE FLUID PIPELINES</b>													
<b>TYRE PRESSURE AND CONDITION</b>													
<b>SUSPENSION</b>													
<b>HEADLIGHT</b>													
<b>COOLING LIQUID</b>	Replace every 2 years												
<b>RADIATOR</b>													
<b>NUTS, BOLTS AND AND FASTENINGS</b>													
<b>VEHICLE AND BRAKE TEST</b>													

REPLACE	CHECK	CLEAN	LUBRICATION	ADJUSTMENT

# PERIODIC MAINTENANCE

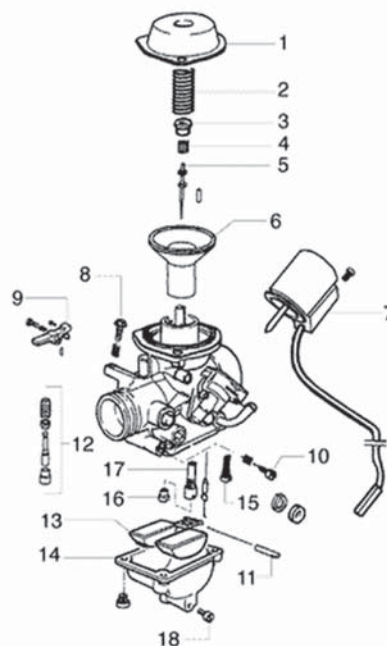
## CARBURETTOR

- Disassemble all carburettor components, accurately wash them in solvent, then dry them with compressed air. To ensure thorough cleaning, pay special attention to the passages in the carburettor body.
- Carefully check the condition of all components.
- The throttle must slide freely in the chamber, if the play is excessive because of wear-replace the throttle.
- Replace the carburettor if the chamber shows signs of wear as to prejudice the valve's regular seal or free sliding (though it is new).
- When reassembling the carburettor, it is a good rule to replace the gaskets.

### WARNING

PETROL IS HIGHLY EXPLOSIVE. ALWAYS FIT NEW SEALS AND GASKETS TO PREVENT LEAKAGE.

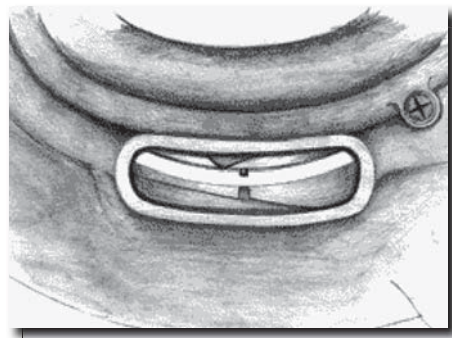
Diaphragm cover	01
Throttle valve spring	02
Conical needle support	03
Conical needle spring	04
Conical needle	05
Throttle valve diaphragm	06
Automatic starting device	07
Idle speed adjusting screw	08
Accelerating pump rocker	09
Idle mixture adjusting screw	10
Float pin	11
Accelerating pump assembly	12
Float	13
Float chamber	14
Idling Jet	15
Main jet	16
Diffuser	17
Float chamber drain screw	18



# PERIODIC MAINTENANCE

## CHECKING THE SPARK ADVANCE

- To check the ignition advance, use the stroboscopic lamp with induction collet connected to the spark plug power supply cable.
- Connect the induction collet according to the right polarity (the arrow on the collet must be facing the spark plug).
- Set the lamp selector to the central position (1 spark = 1 driving shaft revolution as in 2 stroke engines).
- Start the engine and check that the lamp is in good working order and that the rpm counter reads high speeds too (e.g. 8,000 rpm).
- If you detect abnormal flashes or rpm reads, increase the resistive load on the spark plug supply line (10 - 15 KΩ in series with the H.V. cable).



## Version 125

- Remove the slit plastic cap on the flywheel cover.
- Adjust the lamp flash dephasing corrector to make the reference on the flywheel cover collimate with the level on the water pump drive. Read the advance degrees indicated by the stroboscopic lamp.

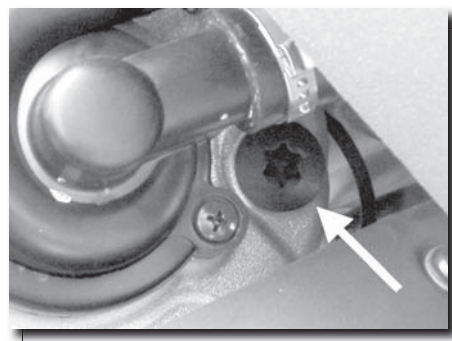
### Characteristic

Ignition advance (before T.D.C) 125

$10^{\circ} \pm 1^{\circ}$  at 2000 r.p.m. -  $34^{\circ} \pm 1^{\circ}$  at 6000 r.p.m

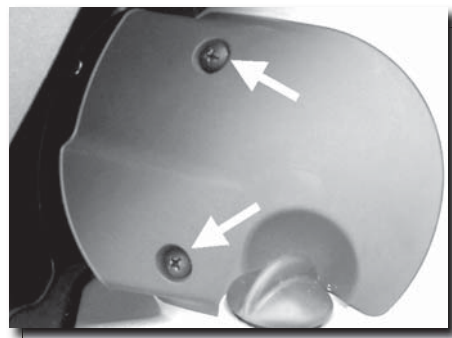
## Version 250

- Remove the spark plug.
- Remove the plastic cover from the slotted hole on the flywheel cover, indicated in the picture.

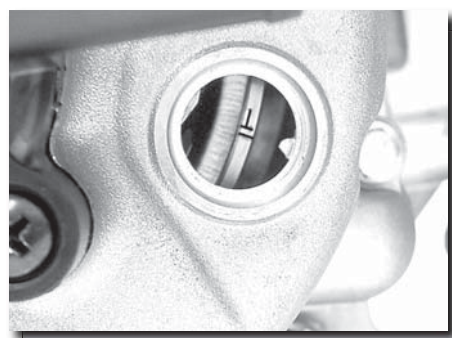


# PERIODIC MAINTENANCE

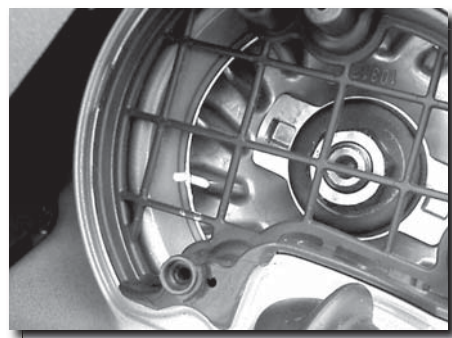
- Remove the transmission cooling air inlet, shown in the picture.



- Using a screwdriver rotate the fan, mounted onto the drive pulley, until the marking on the flywheel is aligned with that stamped on the fly-wheel cover, as shown in the picture.



- Mark the alignment between fan and transmission cover on the transmission side, as shown in the picture.
- Refit the spark plug.
- Refit the plastic cover on the flywheel cover.



## Characteristic

Spark advance check, 250cc  
from  $10^{\circ} \pm 1^{\circ}$  at 2000 rpm

through  $28^{\circ} \pm 1^{\circ}$  at 6500 rpm

# PERIODIC MAINTENANCE

- Check that the advance degrees match the revolution speed as indicated in the tables.
- In case of abnormal values, check the Pick-Up and the control unit supplies (positive-negative); replace the control unit, if required.
- A new control unit prevents the engine from rotating at over 2,000 rpm.
- The programmed control unit allows the engine revolution within the prescribed limits.

## Specific tooling

020330Y Stroboscopic gun for two- and four-stroke engines

## VERSION 125

### SPARK ADVANCE VARIATION

SPECIFICATION	DESC./QUANTITY
Tripping threshold	First threshold: 10700 $\pm$ 50 Second threshold: 11000 $\pm$ 50
Restoration threshold	First threshold: 10600 $\pm$ 50 Second threshold: 10900 $\pm$ 50
Spark suppression	First threshold: 1 spark out of 7 Second threshold: 2 sparks out of 3

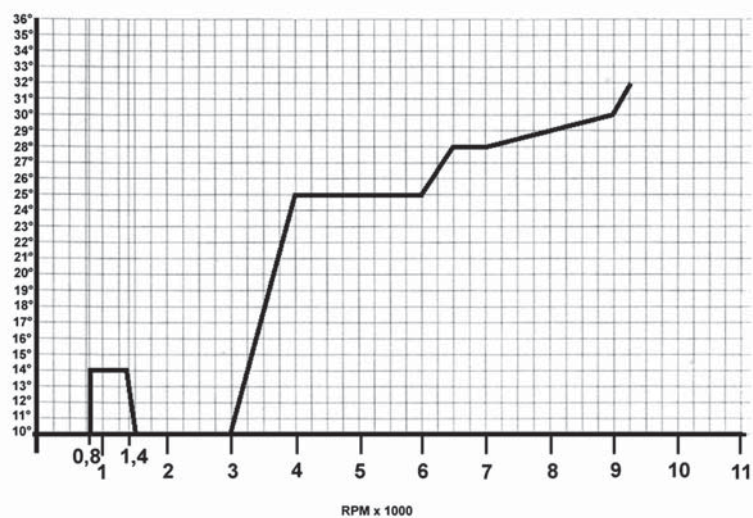


# PERIODIC MAINTENANCE

## VERSION 250

### SPARK ADVANCE VARIATION

SPECIFICATION	DESC./QUANTITY
Tripping threshold	First threshold : $9600 \pm 50$ Second threshold : $9800 \pm 50$
Restoration threshold	First threshold : $9500 \pm 50$ Second threshold : $9700 \pm 50$
Spark suppression	First threshold : 1 spark out of 7 Second threshold: 2 sparks out of 3

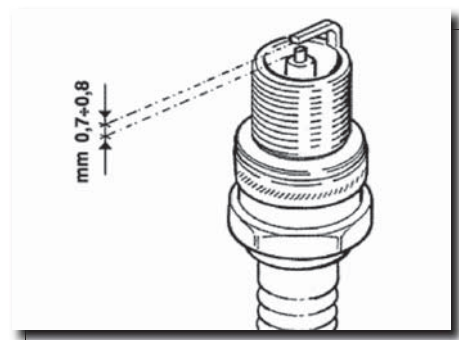




# PERIODIC MAINTENANCE

## SPARK PLUG

- Put the vehicle on the central stand.
- Open the door on the left side of the vehicle by levering in the recess in the lower part of the door after removing the screw.
- Disconnect the spark plug HV cable cap. - Unscrew the spark plug with the spanner provided.
- Check the spark plug to see if the insulator is cracked, the electrodes are worn out or excessively sooty. Also check the condition of the seal washer and measure the spark gap with a suitable thickness gauge.
- If necessary adjust the spark gap by carefully bending the side electrode. If the spark plug has any of the defects mentioned above, replace it with a plug of the recommended type.
- Insert the plug into the hole with the proper inclination, screw it in fully by hand and then tighten it with the specially designed spanner.
- Push the spark plug cap all the way down onto the spark plug and then proceed to the reassembly.



### CAUTION

THE SPARK PLUG MUST BE REMOVED WITH COLD ENGINE. THE SPARK PLUG SHOULD BE REPLACED EVERY 12,000 KM. THE USE OF NONCONFORMING IGNITION CONTROLLERS, AND SPARK PLUGS OTHER THAN THOSE PRESCRIBED CAN SERIOUSLY DAMAGE THE ENGINE.

### Characteristic

Spark plug (250) ~ ^Z.S- iz5c)  
CHAMPION RG4HC

Distance between the electrodes  
mm 0,7 - 0,8

### Pares de apriete (N.m)

Spark plug 12 ÷ 14

# PERIODIC MAINTENANCE

## HUB OIL

Check that there is oil in the rear hub. (quantity of oil contained ~ 250 cc). Proceed as follows in order to check the hub oil level:

- 1) Take the vehicle to a flat area and rest it on the support.
- 2) Unscrew the oil bar «A», dry it with a clean cloth and reinsert it, screwing it in completely.
- 3) Extract the rod and check that the level is up to the mark indicated in the image.
- 4) Screw the bar back in, checking that it is tightly in place.

### N.B.

THE NOTCHES ON THE HUB OIL LEVEL BAR, WITH THE EXCEPTION OF THAT INDICATING THE MAX LEVEL, REFER TO SOME OF THE MANUFACTURER'S OTHER MODELS AND HAVE NO SPECIFIC FUNCTION AS FAR AS REGARDS THIS VEHICLE.

### WARNING

USING THE VEHICLE'S HUB WITH INSUFFICIENT LUBRICATION OR WITH CONTAMINATED OR IMPROPER LUBRICANTS, ACCELERATES THE WEAR AND TEAR OF THE MOVING PARTS AND CAN CAUSE SERIOUS DAMAGE.

### ENVIRONMENT

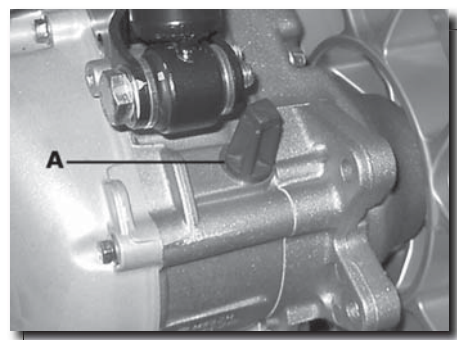
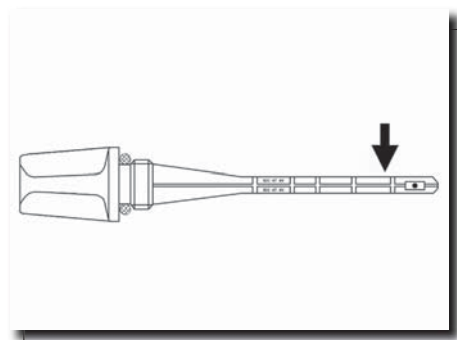
THE OIL USED CONTAINS ENVIRONMENTALLY HARMFUL SUBSTANCES. FOR THE REPLACEMENT OF THE HUB OIL WE RECOMMEND TURNING TO AN AUTHORIZED PIAGGIO SERVICE CENTRE THAT IS EQUIPPED FOR THE DISPOSAL OF USED OIL IN RESPECT OF NATURE AND LEGAL REGULATIONS.

### WARNING

WHEN REPLACING THE HUB OIL PREVENT IT FROM COMING INTO CONTACT WITH THE REAR BRAKE DISC.

### Recommended products

SAE 80W/90 Oil that passes API GL3 specifications



# PERIODIC MAINTENANCE

## CHECK

- Move the vehicle to a flat ground and rest it on the stand.
- Unscrew the oil bar, dry it with a clean cloth and reinsert it, screwing it in thoroughly.
- Extract the bar and check that the oil level reaches the second notch of the bar from the bottom.
- Screw the oil bar back on, checking that it is tightly in place.

## Recommended products

Oil SAE 80W/90 of higher quality than API GL3 specifications

## Locking torques (N\*m)

Hub oil exhaust cap 15÷17

## REPLACEMENT

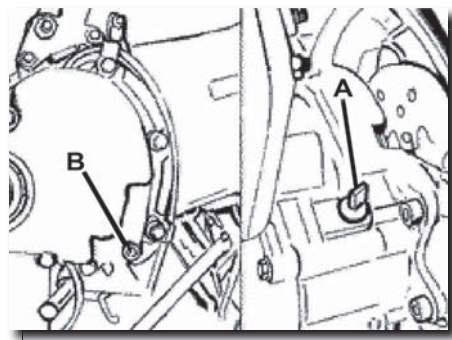
- Remove oil filler plug "A".
- Unscrew oil drain plug "B" and drain all the oil.
- Retighten the oil drain plug and then fill the hub with fresh oil.

## Recommended products

Rear hub oil  
SAE 80W/90 Oil that passes API GL3 specifications

## Locking torques (N\*m)

Hub oil drain screw 15 - 17 Nm



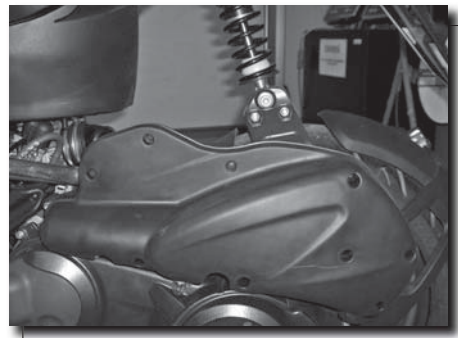
## AIR FILTER

- Remove the left footboard and the left side panel as described in Chapter Bodywork.
- Remove the cleaner cap after loosening the 9 fixing screws.
- Pull out the filter element.
- Replace the air filter with a new one.

# PERIODIC MAINTENANCE

## **N.B.**

CHECK AND IF NECESSARY BLOW THE AIR FILTER EVERY 6,000 KM. DIRECT THE AIR JET FROM THE INSIDE TO THE OUTSIDE OF THE FILTER (I.E. IN THE OPPOSITE DIRECTION TO THE AIR FLOW DURING NORMAL ENGINE OPERATION). EVERY 6,000 KM, DURING THE SCHEDULED SERVICE, REMOVE THE RETAINER, TAKE OFF THE RUBBER CAP FROM UNDER THE FILTER BOX AS SHOWN IN THE FIGURE AND DRAIN ANY OIL RESIDUES.



## **Cleaning (Every 12,000 Km):**

- Wash with water and shampoo.
- Dry with light jets of compressed air and wipe with a clean cloth.
- Soak with a 50 fuel-oil mixture for filters.
- Let the filter cartridge drip and then squeeze it between the hands without wringing.
- Refit the filter element.

## **CAUTION**

DO NOT RUN THE ENGINE IF THE AIR FILTER IS NOT IN PLACE AS THIS WOULD RESULT IN EXCESSIVE WEAR OF THE CYLINDER AND PISTON AS WELL AS IN DAMAGE TO THE CARBURETTOR.

## **CAUTION**

IF THE VEHICLE HAS RIDDEN ON DUSTY ROADS, THE AIR FILTER MUST BE CLEANED MORE FREQUENTLY THAN WHAT INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

## **Recommended products**

Air filter sponge oil

Mineral oil with specific additives to increase adhesion  
ISO VG 150

# PERIODIC MAINTENANCE

## ENGINE OIL

### REPLACEMENT

The engine oil should be replaced after the first 1,000 km, and then every 6,000 km for the 125cc version and 12,000 km for the 250cc version. The engine must be drained through the net filter draining cap «B» on flywheel side; in addition, to facilitate the drainage, oil dipstick «A» should be loosened. Once the engine oil has been drained, remove oil cartridge «C».

Since a certain oil quantity remains inside the circuit, the fill-up must be carried out with 600-650cc of fresh oil poured through filler cap «A». Hence start the vehicle, let the engine run for a few minutes, and then shut it back down; after approx. five minutes, check the level and top-up if necessary, without exceeding the MAX mark.

### N.B.

RENEW THE OIL WHEN THE ENGINE IS HOT.

### Recommended products

Engine oil

Synthetic oil SAE 5W/40 of higher quality than API SJ specifications

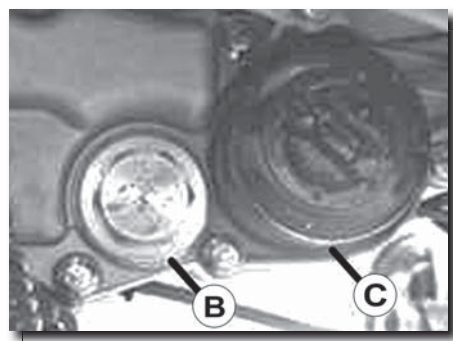
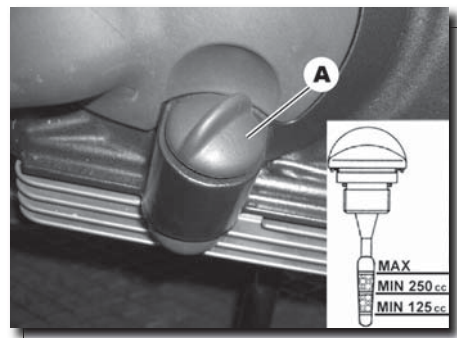
### Locking torques (N\*m)

Engine oil drain plug 24 - 30 N.m

### CHECK

In four-stroke engines oil is used to lubricate the valve gear components, the crankshaft bearings and the power plant. A lack of engine oil can cause serious damage to the engine. In all four-stroke engines, oil deterioration and consumption are, to some extent, normal, especially during running-in.

Consumption partly depends on the riding style (for example, constantly riding at full throttle increases oil consumption).

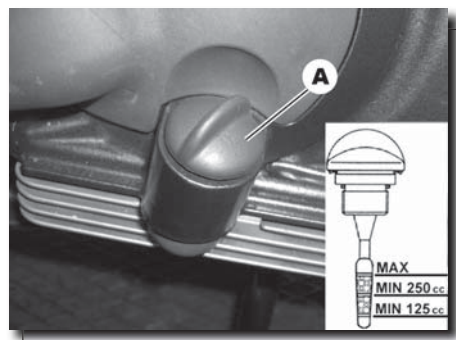


# PERIODIC MAINTENANCE

**Perform this operation when the engine cold, as described below:**

- 1) Put the vehicle on its central stand on a flat surface.
- 2) Unscrew dipstick "A", dry it with a clean cloth and refit by screwing it completely.
- 3) Remove the dipstick again and check that the oil level is between the MAX and MIN marks on the dipstick; top up if necessary.

The MAX level mark indicates an amount of about 1100 cc of engine oil. The level will be lower if checked after using the vehicle (i.e. when the engine is hot). To obtain a correct indication of the oil level, wait for at least 10 minutes after switching off the engine.



## **Characteristic**

Engine oil (125)  
-1100 cc

Engine oil (250)  
-1200 cc

If the oil level is too low, top up by adding fresh oil without exceeding the MAX level.

Approximately 400 cc of oil are needed to restore the level between the MIN and MAX marks.

## **ENGINE OIL FILTER**

The oil cartridge must be replaced with every oil replacement. For top-ups and replacements only use fresh oil of the recommended type.

Check that the net filter O-rings and drainage cap are not worn out and in good conditions. Lubricate O-rings and replace net filter and oil drainage cap; tighten at the prescribed torque. Install the new cartridge filter after lubricating the O-ring. Fill with fresh engine oil.

## **Recommended products**

Engine oil 4T

Synthetic oil SAE 10W/40 of higher quality than API SJ specifications

# PERIODIC MAINTENANCE

## OIL PRESSURE WARNING LIGHT

Oil pressure warning light. A warning light on the instrument panel comes on when the ignition key is turned to the "ON" position. The light must go out after the engine has started.

**Should the warning light come on while braking, idling or cornering, check the oil level and the lubrication system as soon as possible.**

## CHECKING THE IGNITION TIMING

- Remove the four fixing screws and detach the flywheel cover, with the water pump and hoses, from the engine.

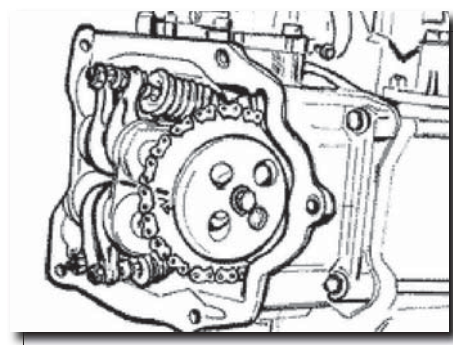
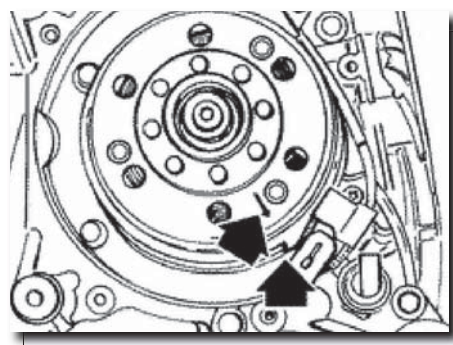
- Turn the flywheel until the reference mark reaches the fine machining on the crankcase, as shown in the picture (TDC). Ensure the 4V mark, stamped on the camshaft drive pulley, is aligned with the reference mark on the head, as shown in the second figure. If the mark is on the opposite side of the sign stamped on the head, crank the engine so that the crankshaft computes a complete revolution.

- The TDC reference mark is also shown on the flywheel cooling fan and cover.

In order to use these markings, remove the spark plug and crank the crankshaft backwards, using a retaining tool to hold the camshaft driving pulley.

### **N.B.**

**IF THE TIMING ASSEMBLY IS NOT IN PHASE, ADJUST IT AS REQUIRED.**





# PERIODIC MAINTENANCE

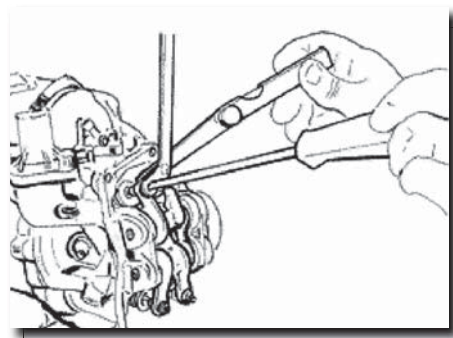
## CHECKING THE VALVE CLEARANCE

-To check the valve clearance, you have to make the point references coincide

-Check that the clearance between the valve and register corresponds to the values shown using a proper thickness gauge. If the values of the valve clearances - intake and discharge, respectively are different than those given below, adjust them by loosening the lock nut and using a screwdriver on the register as shown in the figure.

**Air intake:** 0,10 mm (cold)

**Discharge:** 0,15 mm (cold)



## COOLING SYSTEM

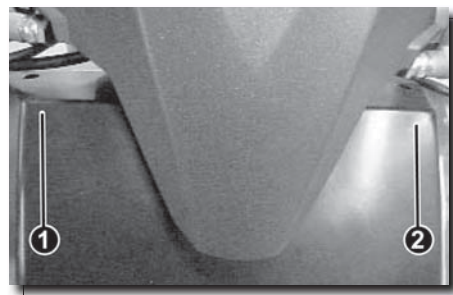
### TOP-UP

The fluid level inspection should be carried out every 6,000 km when the motor is cold, following the methods indicated below:

- Rest the vehicle on the central stand and on a flat ground.

#### Accessing the coolant level indicator

To check the level of coolant, remove the cap on top (remove screws 1 and 2).



- Top up, if the fluid level is near to or below the MIN level into the expansion tank. The fluid level should always be between the MIN and MAX level.

- The cooling fluid consists of a mixture of 50 demineralised water and ethylene glycol and corrosion inhibitors based anti-freeze solution.

### ATENCIÓN

TO PREVENT THE COOLANT FROM LEAKING OUT OF THE EXPANSION TANK DURING USE, BE SURE TO NEVER EXCEED THE MAX LEVEL WHEN REFILLING



# PERIODIC MAINTENANCE

## **BRAKING SYSTEM**

### **Level check**

Proceed as follows:

- Rest the vehicle onto its centre-stand and align the handlebars;
- Check the liquid level through the inspection hole «A».

A certain decrease in the liquid level is due to the wear of the pads.

### **Top-up**

Use the following procedure:

Loosen the two screws, remove the reservoir cap, remove the gasket and top up only with the prescribed fluid without exceeding the maximum level.

### **CAUTION**

USE ONLY DOT 4 BRAKE FLUID.

### **CAUTION**

KEEP THE BRAKE FLUID AWAY FROM THE SKIN, THE EYES AND CLOTHING. IN CASE OF CONTACT, RINSE GENEROUSLY WITH WATER.

### **CAUTION**

THE BRAKE FLUID IS HIGHLY CORROSIVE. TAKE CARE NOT TO SPILL IT ON THE PAINTWORK.

### **CAUTION**

THE BRAKE FLUID IS HYGROSCOPIC, I.E. IT ABSORBS HUMIDITY FROM THE AIR. IF THE HUMIDITY CONTAINED IN THE FLUID EXCEEDS A GIVEN CONCENTRATION, THE BRAKING ACTION BECOMES INSUFFICIENT.

NEVER DRAW THE FLUID FROM OPEN OR PARTLY EMPTY CONTAINERS.

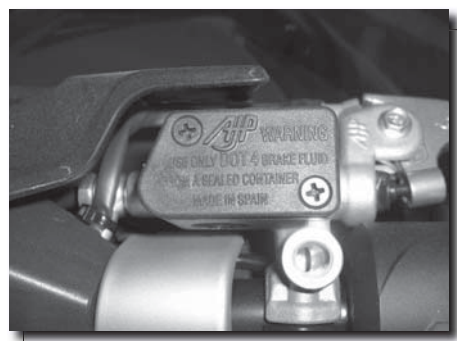
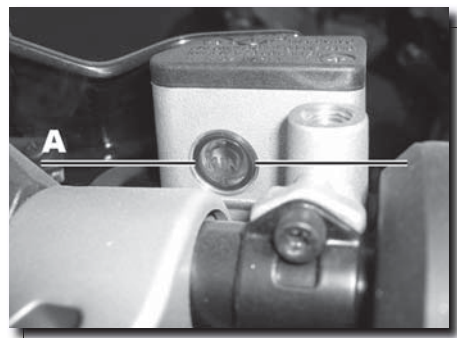
UNDER NORMAL CLIMATIC CONDITIONS THE FLUID SHOULD BE RENEWED EVERY 20,000 KM, OR IN ANY CASE EVERY TWO YEARS.

### **N.B.**

CHANGE THE BRAKE FLUID AND BLEED THE SYSTEM AS DESCRIBED IN CHAPTER BRAKING SYSTEM

### **Recommended products**

Synthetic fluid SAE J 1703 NHTSA 116 DOT 4, ISO 4925

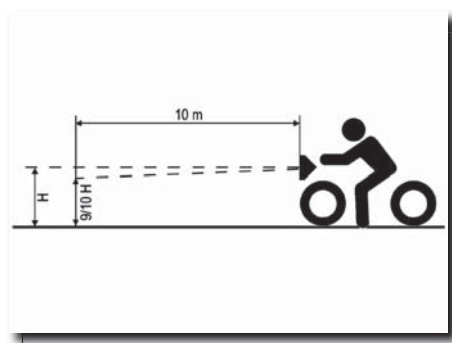
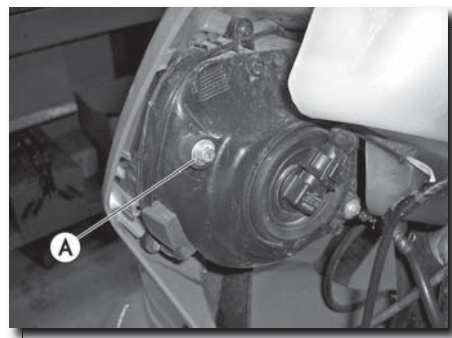


# PERIODIC MAINTENANCE

## HEADLIGHT ADJUSTMENT

Proceed as follows:

1. Position the vehicle in riding conditions, and with the tyres inflated at the prescribed pressure, on a horizontal surface 10m away from a half-lit white screen, ensuring the vertical axis of the vehicle is perpendicular to the screen;
2. Turn on the headlight and check the distance between the ground and the horizontal line which separates the lit area from the dark region, is no more than  $9/10$  and not less than  $7/10$  of the height of the headlight, measured from the ground;
3. If this is not the case, adjust the headlight via screw «A», which may be reached by removing the front grid.



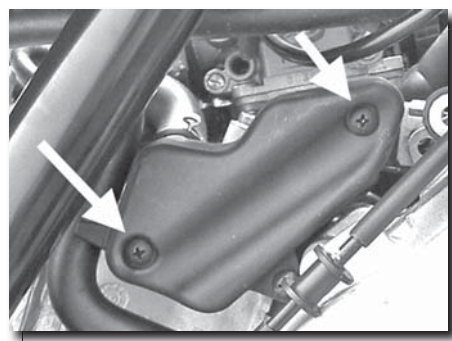
### WARNING

THE PROCEDURE DESCRIBED ABOVE COMPLIES WITH THE "EURONORM" CONCERNING THE MAX. AND MIN. HEIGHT OF THE LIGHT BEAM OF A ROAD VEHICLE. PLEASE CHECK WITH THE LOCAL AUTHORITIES FOR WHAT REQUIREMENTS MUST BE FULFILLED IN EVERY SINGLE COUNTRY WHERE THE VEHICLE IS TO BE USED.

## SAS FILTERS INSPECTION AND CLEANING

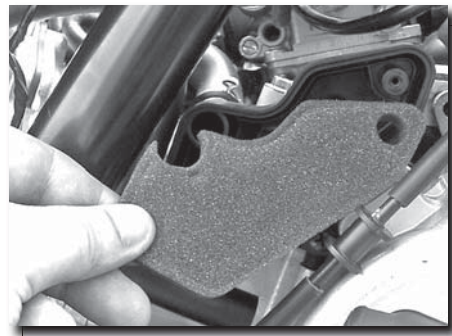
ENGINE 250

- Remove the two screws shown in the picture.



# PERIODIC MAINTENANCE

- Remove the two screws shown in the picture.
- Remove the filter shown in the picture.
- Inspect the gasket.
- Ensure the SAS filter box is not cracked or deformed.
- Accurately clean the SAS filter. In the event of break-ups or abnormal deformations, proceed with the replacement. For the reassembly, follow the above operations in the reverse order.



## CAUTION

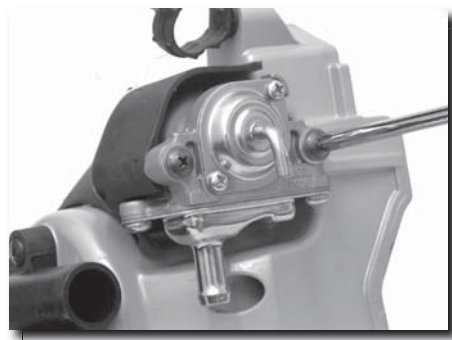
IF THE VEHICLE HAS RIDDEN ON DUSTY ROADS, THE AIR FILTER MUST BE CLEANED MORE FREQUENTLY THAN WHAT INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

## CAUTION

NEVER LET THE ENGINE RUN WITHOUT THE SECONDARY AIR FILTER.

## Engine 125

- Remove the flywheel cover.
- Remove the two SAS valve fixing screws, as shown in the figure, and remove the SAS valve with its O-ring from the bracket.
- Remove the plastic bracket with its packing as shown in the picture.



# PERIODIC MAINTENANCE

- Ensure the SAS filter box is not cracked or deformed.
- Inspect the packing.
- Accurately clean external and internal filters. In the case of break-ups or abnormal deformations, proceed with the replacement
- Ensure the manifold channelling secondary air into the head is not cracked, deformed, or has undergone overheats. Replace as necessary.
- Ensure the metallic manifold is not cracked. For the reassembly, follow the above operations in the reverse order, taking particular care in correctly installing the rubber manifold connecting the SAS valve to the exhaust system.

## CAUTION

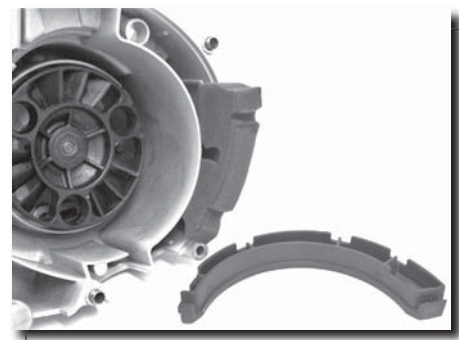
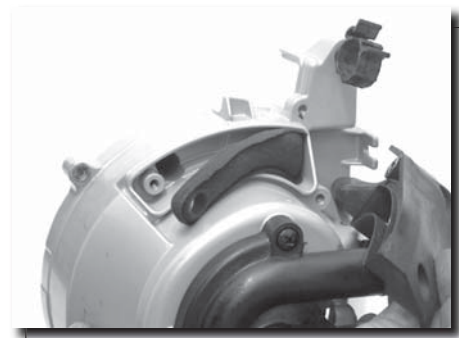
LEAKS FROM THE MATING PLANE BETWEEN SAS VALVE AND FLYWHEEL, RESULT IN AN INCREASE IN NOISE EMISSIONS FROM THE SAS.

## CAUTION

IF THE VEHICLE HAS RIDDEN ON DUSTY ROADS, THE AIR FILTER MUST BE CLEANED MORE FREQUENTLY THAN WHAT INDICATED IN THE SCHEDULED MAINTENANCE TABLE.

## CAUTION

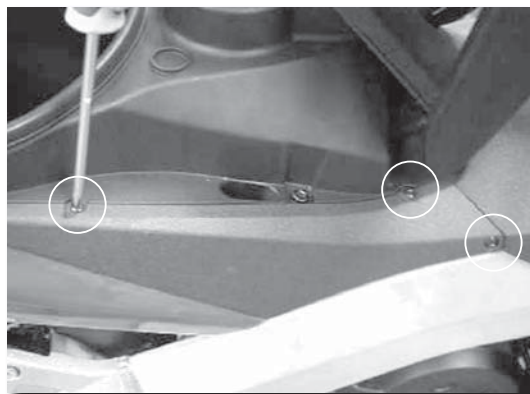
NEVER LET THE ENGINE RUN WITHOUT THE SECONDARY AIR FILTER.



# DISMANTLING

## 1. SEAT SIDE TRIM

- Extract the 3 securing screws (2 Philips 3.6x14 self-tappers and one 5x16 Allen M3) from each cover.



## 2. COWLING

- Extract the 6 screws (5x12 Allen M3) from under the cowl.



- Extract the drawer for the tool kit and its cover, by removing the 2 Philips screws with washers.

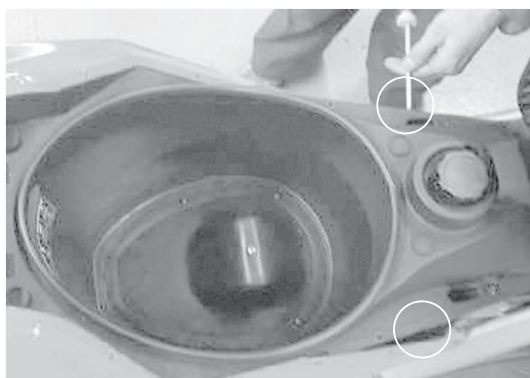
- Extract the 8 top screws (Philips 3.6x14 self-tappers with washer) and the 2 side screws (Philips 6x16 with washer).

- Pull the cowl backwards slightly to access the turn indicator connections and disconnect them.

- Extract the cowl backwards.

### N.B.

TO REPLACE THE PILOT LIGHTS IT IS ONLY NECESSARY TO EXTRACT THE TWO PILOT LIGHT SCREWS.





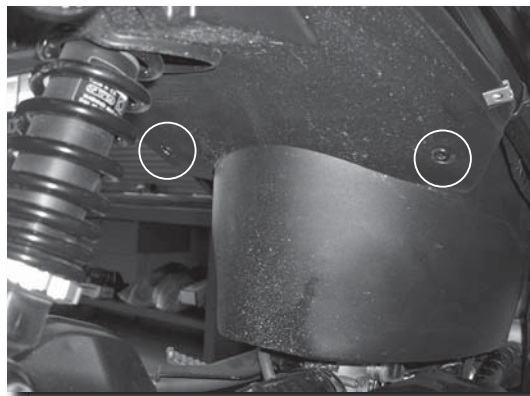
# DISMANTLING

## 3. LOWER COWLING COVER

- Extract the 2 securing screws (Philips 6x16 with washer)

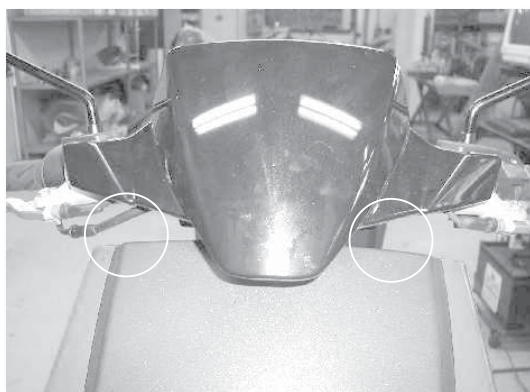
### N.B.

TO CONTINUE WITH THE HELMET HOLDER WE NEED TO CONTINUE DISMANTLING THE FRONT PART, SINCE THE PETROL TANK FRONT BREATHER PIPE PASSES THROUGH THE HELMET HOLDER.



## 4. WATER-OIL TANK COVER

- Extract the 2 top screws (Philips 5x12).



## 5. SIDE COVERS

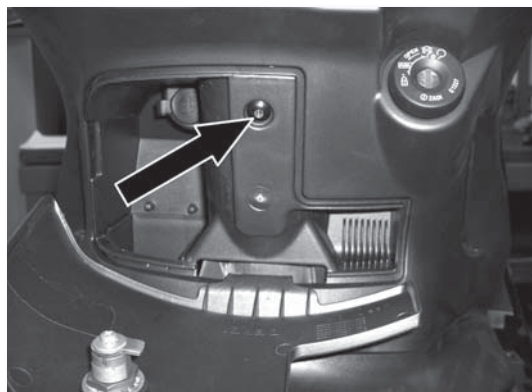
- Pull them gently backwards.



# DISMANTLING

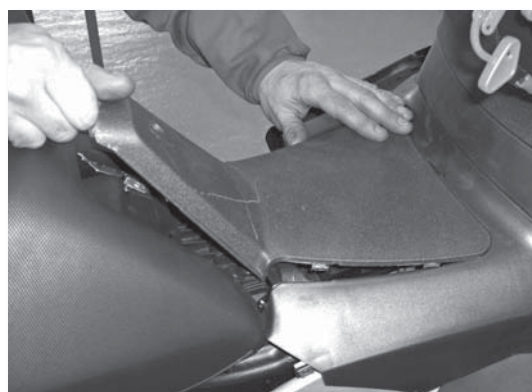
## 6. SHIELD INNER COVER

- Extract the 2 screws (5x12 Allen M3).
- Extract the 3 top screws (2 Philips 3.6x14 self-tappers and one 6x16 Allen screw with washer).



## 7. BATTERY COVER

- Extract the Philips screw and separate the cover from the 2 securing flaps.



## 8. PETROL TANK COVER

- Extract the bottom covers (left and right), by removing the 6 screws (Philips 5x16 with washer) and the two air inputs, 3 screws (1 Philips 3x10 self-tapper, 1 Philips 3.6x10 self-tapper and 1 Philips 5x16), as there are 2 screws (Philips 6x16 with washer) that are inaccessible without carrying out this step.



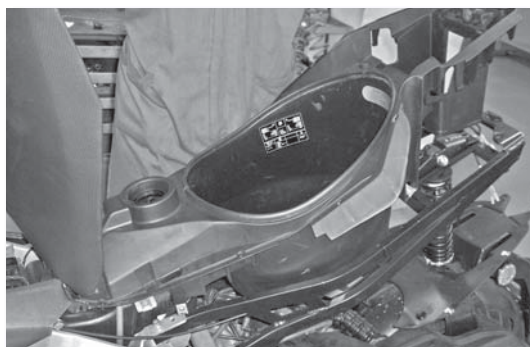
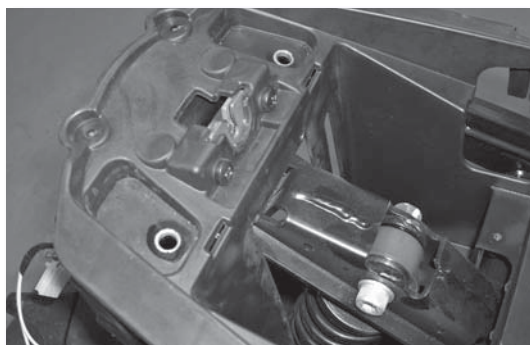
# DISMANTLING

- After extracting the 6 side screws and the central (Allen M3 5x12) screw from the tank cover, lift up the tank cover.



## 8. HELMET CARRIER

- Remove the battery and cables.
- Extract the 6 securing screws (2 Philips 8x45, 2 Philips 6x19 with washer and 2 8x25 bolts), the petrol tank cover, the breather pipe and the seat opening cable.

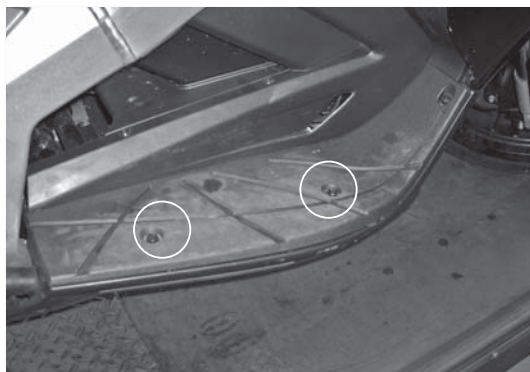




# DISMANTLING

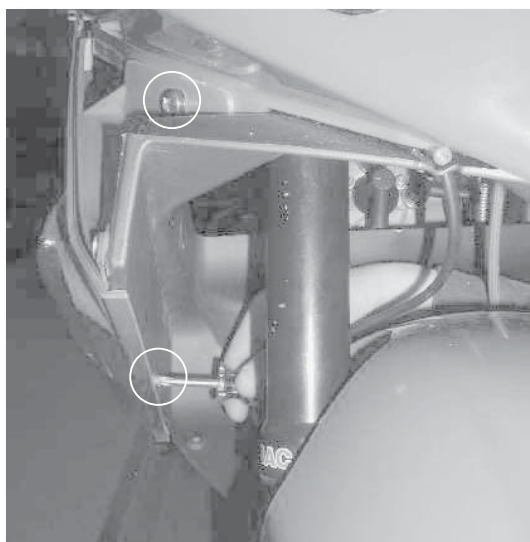
## 9. FOOTRESTS

- Remove the 5 securing screws (2 Philips 6x16 with large washer, 2 Philips 6x16 with small washer and 1 Philips 4.8x25 self-tapper), and the one joining the two fairings.



## 10. SIDE COVERS

- Remove the 2 securing screws (1 Philips 6x16 with 1 washer and 1 Philips 3.6x10 self-tapper), and the turn indicator wire.



## 11. SHIELD

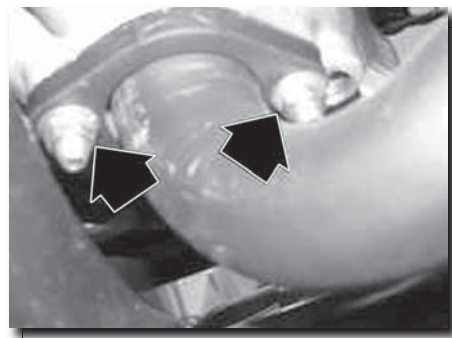
- Remove the helmet carrier.
- Extract the securing screw (Philips 6x16 with washer).



# ENGINE

## **EXHAUST ASSY. REMOVAL**

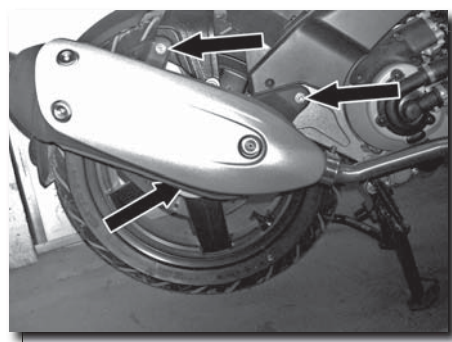
- Unloose the two fixings of the exhaust manifold on the head.



- Unloose the 3 screws fixing the muffler to the supporting arm.

- Remove the muffler assembly.

- For the reassembly, follow the operations indicated above in the reverse order, complying with the tightening torques.



## **Locking torques (N\*m)**

Exhaust pipe/support bracket fixing screw  $27 \div 30$

Exhaust pipe/cylinder head fixing nut  $16 \div 18$

## **REMOVAL OF THE ENGINE FROM THE VEHICLE**

- Disconnect the battery.

- Remove seat, side fairings

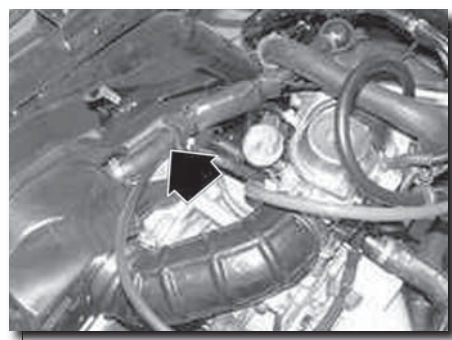
- Drain coolant.

- Remove the silencer assembly.

- Remove the silencer mounting bracket.

- Remove the rear wheel.

- Remove the bottom securing devices, shock absorbers and the left and right-hand brackets corresponding to the rear wheel flange.





# ENGINE

- Remove the throttle cable.
- Detach the air filter bellow and manifold shown in the figure.
- Detach engine earth cable.
- Disconnect the electrical devices on the carburettor and the starter motor power cord.
- Detach the inlet and outlet carburettor fuel lines and the cooling circuit hoses (head outlet and thermostat inlet).
- Detach the spark plug H.T. cable.
- Detach the generator wiring from the vehicle's electrical circuit.
- Remove the swing-arm from the engine pivoting.
- The engine may now be removed.

## **WARNING**

PERFORM THESE OPERATION WITH THE ENGINE COLD.

## **WARNING**

BE VERY CAREFUL WHEN HANDLING FUEL.

## **ATENCIÓN**

WHEN INSTALLING THE BATTERY, CONNECT THE POSITIVE CABLE BEFORE CONNECTING THE NEGATIVE ONE

- For refitting the engine onto the vehicle, follow the above operations in the reverse order, complying with the tightening torques given in the Characteristics chapter.
- Check engine oil level and top-up with recommended type as required.
- Fill-up the cooling system.
- Carry out the inspection of throttle and electrical devices.

## **CAUTION**

TAKE CARE NOT TO INVERT THE POSITION OF THE TWO ACCELERATOR CONTROL TRANSMISSIONS. CHECK THAT BOTH SHOW A SLIGHT PLAY WITH THE VALVE IN CONTACT WITH THE REGISTER.

# ENGINE

## **AUTOMATIC TRANSMISSION**

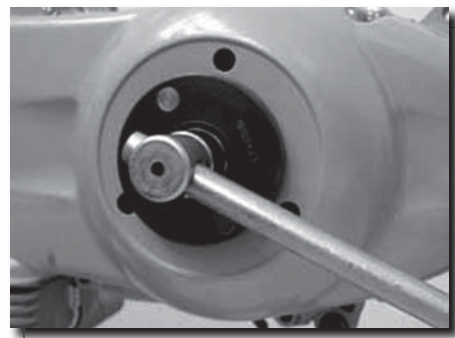
### **TRANSMISSION COVER**

To remove the transmission cover it is necessary to remove the plastic cover first, using a screwdriver on the special guides. Using the clutch bell lock wrench shown in the figure, remove the driven pulley axle locking nut and washer.

#### **Specific tooling**

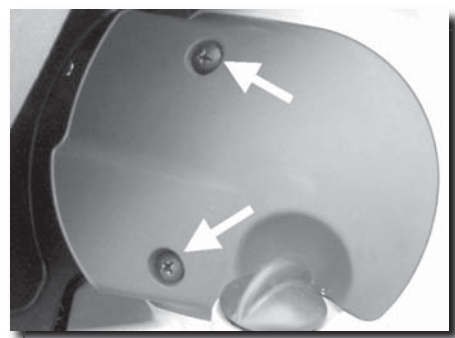
020423Y driven pulley stop key

- Remove the cap/bar of the engine oil filling hole.
- Remove the 10 screws.
- Remove the transmission cover. If this operation is performed directly on the vehicle, it is necessary to remove the transmission compartment cooling air sleeve first.



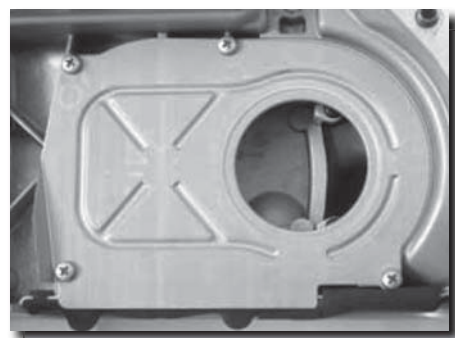
## **AIR DUCT**

- Remove the transmission cooling air inlet, shown in the picture.



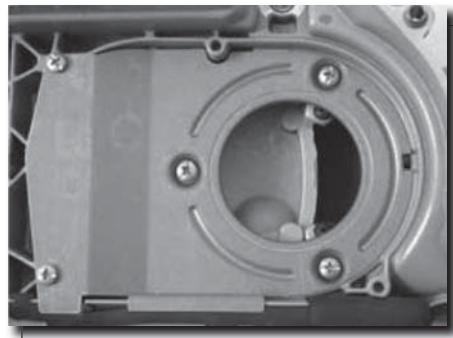
### **Version 125**

- Remove the 4 screws and the case.



# ENGINE

- Remove the 5 screws located on two different surfaces and the case.



## REMOVING THE DRIVEN PULLEY SHAFT BEARING

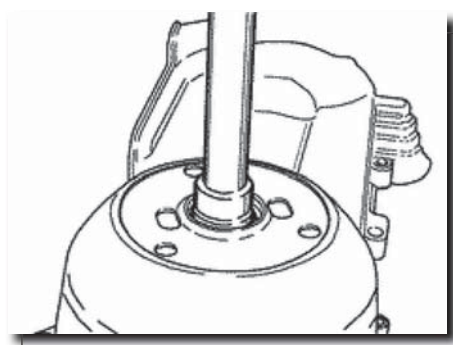
- Remove the snap ring from the cover internal side.
- Remove the bearing from the case using:

### **Specific tooling**

020376Y Handle for punches

020375Y Adapter 28 x 30 mm

020412Y 15 mm guide



## REFITTING THE DRIVEN PULLEY SHAFT BEARING

- Slightly warm the inside of the case to prevent damaging the painted surface.
- Install the bearing into its seat
- Replace the snap ring.

### **CAUTION**

USE AN APPROPRIATE REST SURFACE TO AVOID DAMAGING THE COVER PAINT.

### **N.B.**

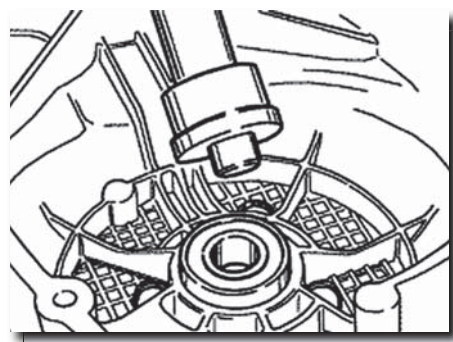
ALWAYS REPLACE THE BEARING WITH A NEW ONE UPON REASSEMBLY.

### **Specific tooling**

020376Y Handle for punches

020357Y 32 x 35 mm adaptor

020412Y 15 mm guide

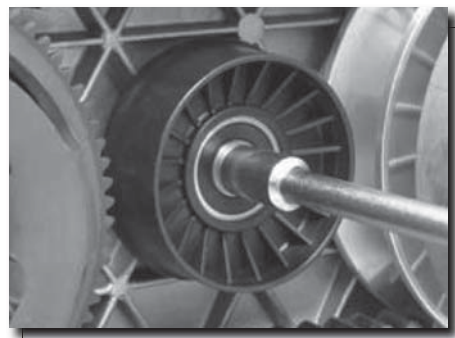


# ENGINE

## BAFFLE ROLLER

### PLASTIC ROLLER

- To reassemble, install the roller with the containment edge on the engine crankcase side.
- Tighten the wrench at the prescribed torque.



- Check that the roller is free from wear and that it rotates freely.
- Remove the special fixing screw as shown in the figure.
- Ensure that the roller outside diameter exhibits no anomalies that may affect the belt operation.



### Locking torques (N\*m)

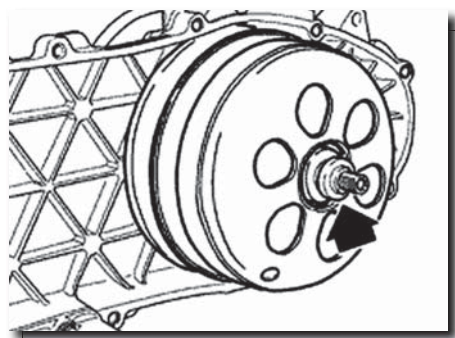
Anti-flapping roller 12÷16

## REMOVING THE DRIVEN PULLEY

Remove the spacer, the clutch bell and the entire driven pulley assembly.

### N.B.

THE ASSEMBLY MAY ALSO BE REMOVED WITH THE DRIVING PULLEY ON.



## INSPECTING THE CLUTCH DRUM

- Check that the clutch bell is not worn or damaged.
- Measure the clutch bell inside diameter.

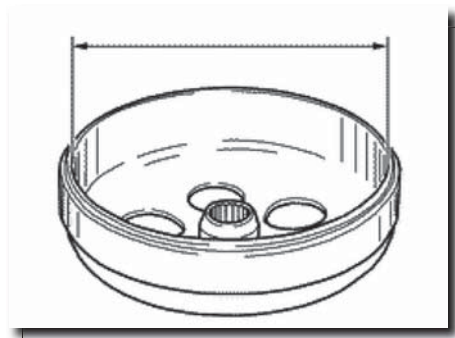
### Characteristic

Max value clutch bell

**Max value:** Ø 134,5 mm

Standard value clutch bell

**Standard value:** Ø 134,2 mm

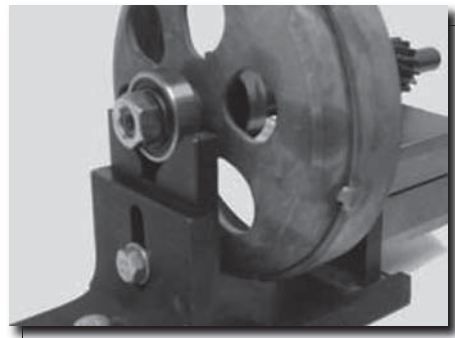




# ENGINE

## Checking the bell working surface eccentricity

- Install the bell on a driven pulley shaft using 2 bearings (inside diameter 15 and 17 mm).
- Lock using the original spacer and nut.
- Place the bell/shaft assembly on the support to check the driving shaft alignment.



- Using a feeler pin comparator and the magnetic base, measure the bell eccentricity.
- Repeat the measure in 3 positions (Central, internal, external).
- In case of anomalies, replace the bell.

## Specific tooling

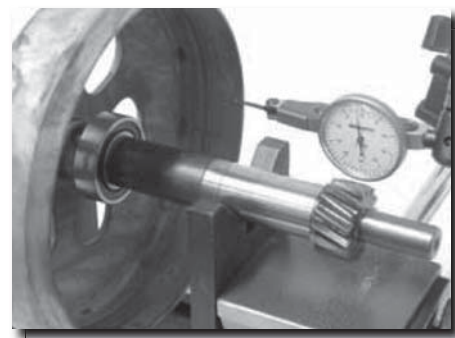
020074Y Crankshaft aligning tool

020335Y Magnetic stand and comparator

## Technical characteristics

**Checking the clutch bell housing:**  
Eccentricity limit.

Acceptable eccentricity limit: 0.15 mm



## REMOVING THE CLUTCH

### Clutch removal (125cc H20)

- Prepare the specific driven pulley spring compressor tool with the medium length pins in position «F» tightened on the inside of the tool.
- Introduce the adapter ring n° 8 into the pins.
- Install the driven pulley assembly on the tool and the nail heads into the adapters.



# ENGINE

- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to release and tighten the clutch nut.

- Using the specific wrench 46x55 component n° 9, remove the clutch fixing nut.

- Separate the components of the driven pulley (clutch, fan and spring with plastic rest).

## CAUTION

THE TOLL MUST BE TIGHTLY FIXED IN THE VICE AND THE CENTRAL SCREW MUST BE MOVED IN ABUTMENT WITH THE TOOL. AN EXCESSIVE TORQUE MAY DEFORM THE SPECIFIC TOOL.

## Specific tooling

020444Y009 wrench 46 x 55

020444Y008 adapter ring

## Version 250

Prepare the specific driven pulley spring compressor tool with the medium length pins in position «C» tightened on the inside of the tool.

- Introduce the adapter ring n° 11 with the chamfering facing the inside of the tool.

- Install the driven pulley assembly onto the tool inserting the 3 pins into the ventilation holes obtained on the mass holding support.

- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to release and tighten the clutch nut.

- Using the specific wrench 46x55 component n° 9, remove the clutch fixing nut.

- Separate the components of the driven pulley (clutch and spring with plastic rest).

## CAUTION

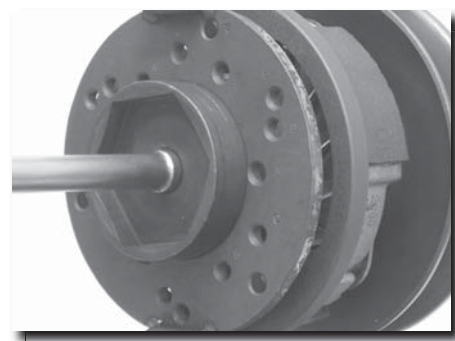
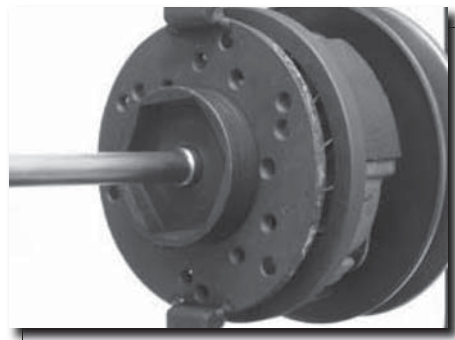
THE TOLL MUST BE TIGHTLY FIXED IN THE VICE AND THE CENTRAL SCREW MUST BE MOVED IN ABUTMENT WITH THE TOOL. AN EXCESSIVE TORQUE MAY DEFORM THE SPECIFIC TOOL.

## Utillaje específico

020444Y011 Adapter ring

020444Y009 wrench 46 x 55

020444Y Driven half pulley spring compressor tool





# ENGINE

## INSPECTING THE CLUTCH

- Check the thickness of the clutch mass friction material.
- The masses must exhibit no traces of lubricants; in that case, check the driven pulley unit seals.

### **N.B.**

UPON RUNNING-IN, THE MASSES MUST EXHIBIT A CENTRAL CONTACT SURFACE AND MUST NOT BE DIFFERENT FROM ONE ANOTHER. DIFFERENT CONDITIONS MAY CAUSE THE CLUTCH TEARING.

### **CAUTION**

DO NOT OPEN THE MASSES USING TOOLS TO PREVENT A VARIATION IN THE RETURN SPRING LOAD.

### **Characteristic**

Check. Minimum thickness  
1 mm



## PIN RETAINING COLLAR

- Remove the collar by hand by turning and pulling at the same time.

### **N.B.**

IN CASE OF DIFFICULTIES, USE 2 SCREW DRIVERS.

### **N.B.**

BE CAREFUL NOT TO INSERT THE SCREW-DRIVERS TOO MUCH TO PREVENT DAMAGES THAT COULD AFFECT THE O-RING SEAL.

- Remove the 4 pins of the servo-system and separate the half-pulleys.



# ENGINE

## REMOVING THE DRIVEN HALF-PULLEY BEARING

- Check that there is no wear and/or noise; if not, replace.
- Remove the lock ring using two flat blade screw-drivers.
- Suitably support the pulley bushing from the threaded side on a wooden surface.
- Remove the ball bearing as shown in the figure, using a pin and a hammer.
- Suitably support the pulley.



### Specific tooling

001467Y035 Bell

- Remove the roller bearing using the modular punch.



### Specific tooling

020376Y Handle for punches

020456Y Ø 24 mm adaptor

020363Y 20mm guide

## INSPECTING THE DRIVEN FIXED HALF-PULLEY

### Version 125

- Measure the pulley bushing outside diameter.
- Check that the contact surface with the belt is free from abnormal wear.

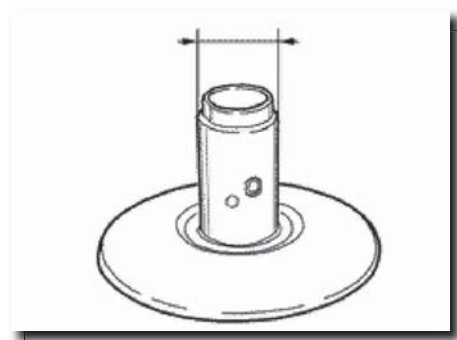
### Characteristic

Standard diameter half-pulley

Standard diameter: Ø 40,985 mm

Minimum diameter half-pulley

Minimum admissible diameter: Ø 40,96 mm



# ENGINE

## Version 250

- Measure the pulley bushing outside diameter.
- Check that the contact surface with the belt is free from abnormal wear.
- Check the riveting.
- Check the belt contact surface planarity.

### Characteristic

Minimum diameter half-pulley

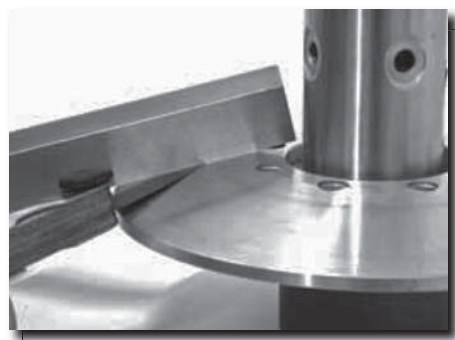
Minimum admissible diameter: Ø 40,96 mm

Standard diameter half-pulley

Standard diameter: Ø 40,985 mm

Wear limit

0,3 mm



## INSPECTING THE DRIVEN SLIDING HALF-PULLEY

### Version 125

- Remove the 2 inside sealing rings and the 2 O-rings
- Measure the mobile half-pulley bushing inside diameter

### Characteristic

Maximum diameter mobile driven half-pulley

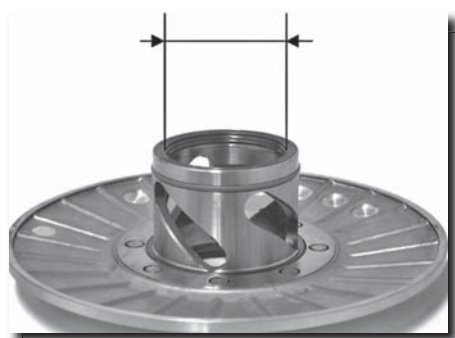
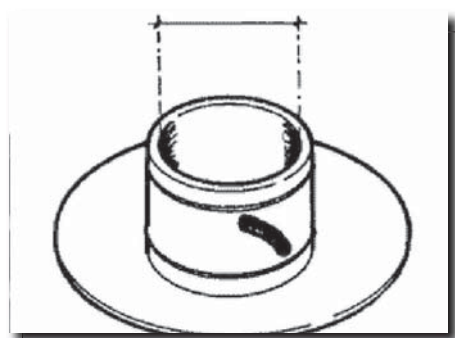
Maximum admissible diameter: Ø 41,08 mm

Standard diameter mobile driven half-pulley

Standard diameter: Ø 41,000 - 41,035 mm

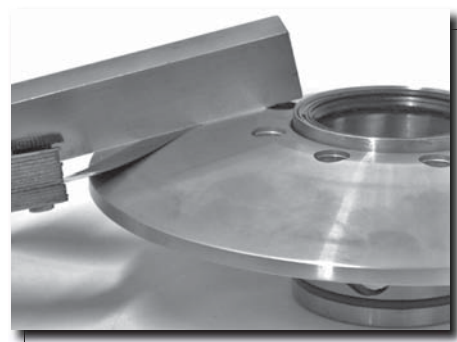
### Version 250

- Remove the 2 inside sealing rings and the 2 O-rings;
- Measure the mobile half-pulley bushing inside diameter.



# ENGINE

- Check that the surface of contact with the belt does not show abnormal wear.
- Check the functionality of the riveting.
- Check the planarity of the belt surface of contact.



## MOBILE LINE HALF PULLEY DIMENSIONS

SPECIFICATION	DESC./QUANTITY
Wear limit	0,3 mm
Standard diameter	Ø 41,000 + 41,035
Maximum admissible diameter	0 41,08 mm

## REFITTING THE DRIVEN HALF-PULLEY BEARING

- Suitably support the pulley bushing from the threaded side on a wooden surface.
- Install a new roller casing as shown in the figure.
- To install the new ball bearing, proceed as shown in the figure using the modular punch.
- Install the lock ring



**N.B.**  
INSTALL THE BEARING WITH VISIBLE SCREENING.

### Specific tooling

020376Y Handle for punches

020375Y Adapter 28 x 30 mm

020424Y Driven pulley roller casing drift

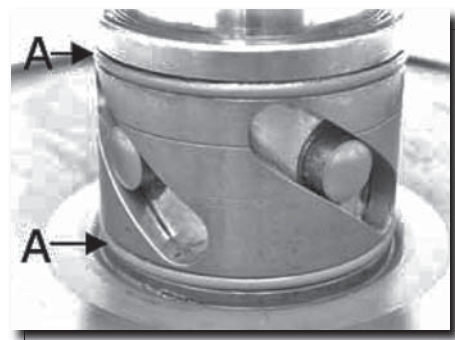


# ENGINE

## REFITTING THE DRIVEN PULLEY

### Version 125

- Insert the new oil guards and O-Rings on the mobile half-pulley.
- Slightly grease the O-Rings (A) shown in the figure.
- Install the half pulley on the bushing using the specific tool
- Check that the pins are free from wear and reassemble into the relative slits.
- Replace the collar to close the servo-system.



Using a bent beak greaser, lubricate the driven pulley unit with about 6 gr. of grease, this operation should be carried out through one of the two holes into the bushing to obtain the exit of the grease from the opposite hole.

This operation is required to prevent the presence of grease beyond the O-rings.

#### N.B.

THE SERVO-SYSTEM MAY BE LUBRICATED BOTH WITH BEARINGS MOUNTED OR UPON THEIR REPLACEMENT; THE INTERVENTION CARRIED OUT DURING THE BEARING OVERHAULING MAY BE EASIER

#### Specific tooling

020263Y Protective sheath

#### Recommended products

Grease for the phonic wheel turning ring

Molybdenum disulphide grease and lithium soap

# ENGINE

## Version 250

- Insert the new oil guards and O-Rings on the mobile half-pulley.
- Slightly grease the O-Ring «A» shown in the figure.
- Install the half pulley on the bushing using the specific tool.
- Check that the pins are free from wear and reassemble into the relative slits.
- Replace the collar to close the servo-system.
- Using a bent beak greaser, lubricate the driven pulley unit with about 6 gr. of grease, this operation should be carried out through one of the two holes into the bushing to obtain the exit of the grease from the opposite hole.

This operation is required to prevent the presence of grease beyond the O-rings.

### N.B.

THE SERVO-SYSTEM MAY BE LUBRICATED BOTH WITH BEARINGS MOUNTED OR UPON THEIR REPLACEMENT; THE INTERVENTION CARRIED OUT DURING THE BEARING OVERHAULING MAY BE EASIER

### Specific tooling

020263Y Protective sheath

### Recommended products

Grease for the phonic wheel turning ring

Molybdenum disulphide grease and lithium soap



## INSPECTING THE CLUTCH SPRING

### Version 250

- Measure the free length of the mobile driven half-pulley spring.

### Characteristic

Standard length (125)

106mm

Limit after use (125)

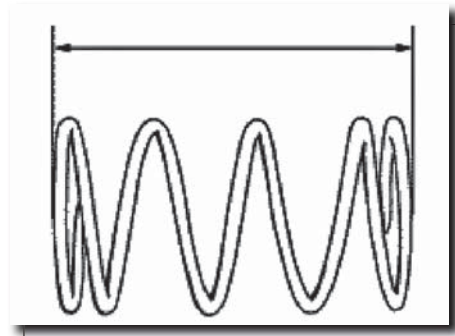
101 mm

Standard length (200 - 250)

123 mm

Limit after use (200 - 250)

118 mm

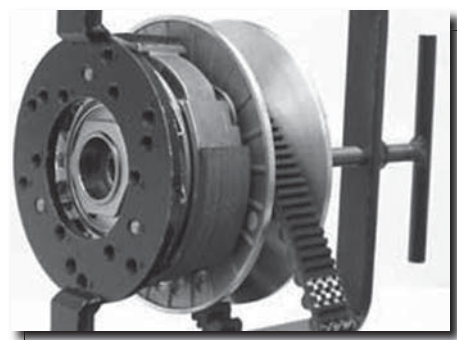
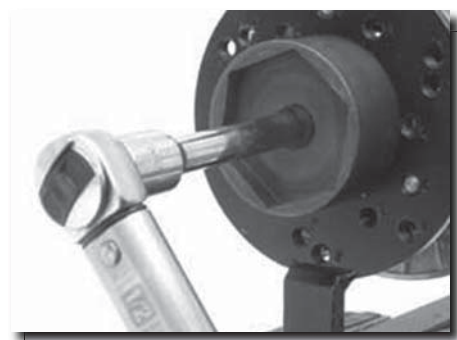




# ENGINE

## REFITTING THE CLUTCH

- Support the driven pulley spring compressor specific tool with the control screw in vertical axis.
- Arrange the tool with the medium length pins screwed in position «C» on the inside.
- Introduce the adapter ring n° 11 with the chamfering facing upwards.
- Insert the clutch on the adapter ring.
- Lubricate the end of the spring that abuts against the servo-system closing collar.
- Insert the spring with relevant plastic support in contact with the clutch.
- insert the driving belt into the pulley unit according to their direction of rotation.
- Insert the pulley unit with the belt into the tool.
- Slightly pre-load the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool into the vice with the control screw in horizontal axis.
- Fully pre-load the spring.
- Apply the clutch fixing nut and tighten it at the prescribed torque using the specific wrench 46x55.
- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Pre-load the clutch contrast spring by turning and pulling at the same time and place the belt in the minimum rolling diameter position.
- Remove the driven pulley /belt assembly from the tool.



# ENGINE

**N.B.**

DURING THE SPRING PRE-LOADING STEP, BE CAREFUL NOT TO DAMAGE THE SPRING PLASTIC ABUTMENT AND THE BUSHING THREADING.

**N.B.**

FOR DESIGN REASONS, THE NUT IS SLIGHTLY ASYMMETRIC; THE SURFACE SHOULD BE MOUNTED IN CONTACT WITH THE CLUTCH.

**Specific tooling**

020444Y Driven half pulley spring compressor tool

020444Y011 Adapter ring

020444Y009 wrench 46 x 55

**Locking torques (N\*m)**

Nut locking clutch assembly on pulley 55 ÷ 60 Nm

## Version 125

- Support the driven pulley spring compressor specific tool with the control screw in vertical axis.

- Arrange the tool with the medium length pins screwed in position «F» on the inside.

- Introduce the adapter ring n° 8 into the pins.

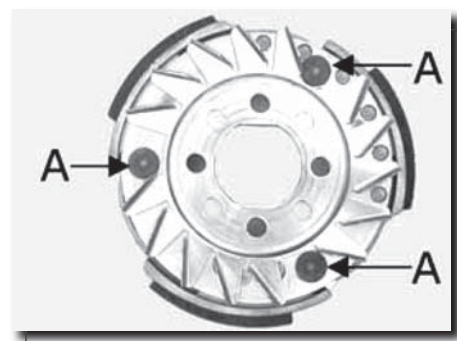
- Pre-assemble the clutch cooling fan in the position in which the keying facets are aligned and the 3 pin heads (A) are fully visible.

- Insert the clutch on the adapter ring.

- Lubricate the end of the spring that abuts against the servo-system closing collar.

- Insert the spring with relevant plastic support in contact with the clutch.

- Insert the driving belt into the pulley unit according to their direction of rotation.





# ENGINE

- Insert the pulley unit with the belt into the tool.
- Slightly pre-load the spring.
- Make sure that the clutch is perfectly inserted into the adapter ring before proceeding to tighten the clutch nut.
- Place the tool into the vice with the control screw in horizontal axis.
- Fully pre-load the spring.
- Apply the clutch fixing nut and tighten it at the prescribed torque using the specific wrench 46x55.
- Loosen the tool clamp and insert the belt according to its direction of rotation.
- Lock the driven pulley again using the specific tool.
- Pre-load the clutch contrast spring by turning and pulling at the same time, up to reaching the maximum pulley opening and place the belt on the minimum rolling diameter.
- Remove the driven pulley /belt assembly from the tool.

**N.B.**  
FOR DESIGN REASONS, THE NUT IS SLIGHTLY ASYMMETRIC; THE SURFACE SHOULD BE MOUNTED IN CONTACT WITH THE CLUTCH.

**N.B.**  
DURING THE SPRING PRE-LOADING STEP, BE CAREFUL NOT TO DAMAGE THE SPRING PLASTIC ABUTMENT AND THE BUSHING THREADING.

**N.B.**  
AN EXCESSIVE AMOUNT COULD IMPAIR THE CLUTCH FUNCTIONS.

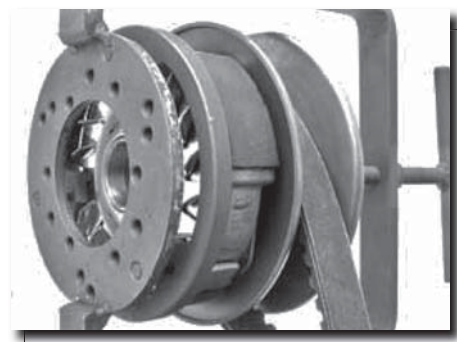
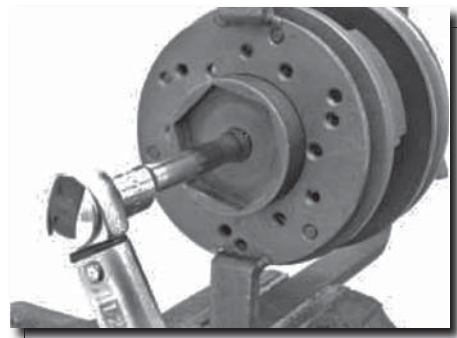
## **Specific tooling**

020444Y011 Adapter ring

020444Y009 wrench 46 x 55

## **Locking torques (N\*m)**

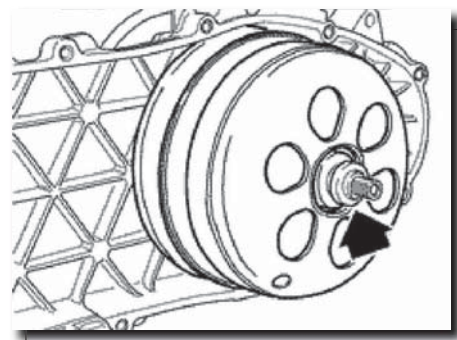
Clutch fixing



# ENGINE

## REFITTING THE DRIVEN PULLEY

- Reinstall the clutch bell and the spacer.



## DRIVE-BELT

- Ensure the drive-belt is not damaged.
- Check the drive-belt width.

### Characteristic

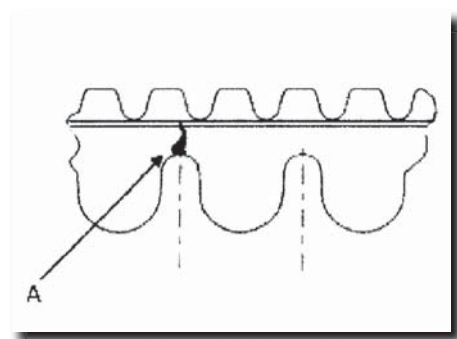
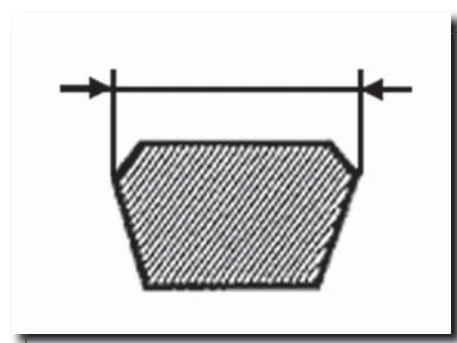
Driving belt minimum width  
21.5 mm

Driving belt standard width  
 $22,5 \pm 0,2$  mm

Driving belt 250 4T - minimum width  
19,5 mm

Driving belt 250 4T - standard width  
 $21,3 \pm 0,2$  mm

During the wear check to be performed according to the scheduled maintenance in the 6,000 Km inspection, in the 18,000 Km inspection, etc., it is advisable to check that the tooth groove bottom is free from deformations and cracks (see figure). In case of cracks, the belt must be replaced. «A»: The tooth groove bottom must be free from deformations and cracks; if not, replace the belt.

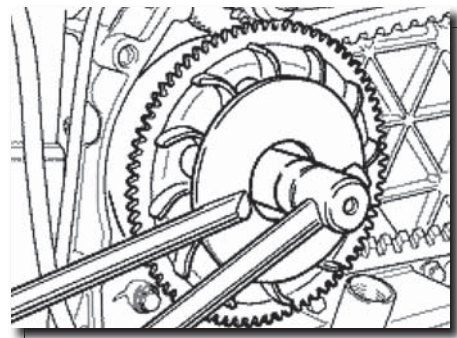


# ENGINE

## REMOVING THE DRIVING PULLEY

### Driving pulley removal (125)

- Using the specific tool, remove the nut with the built-in spring washer, the drive for the versions with kick-starter, and the steel washer.
- Remove the fixed driving half-pulley.
- Remove the steel separation washer from the bushing.

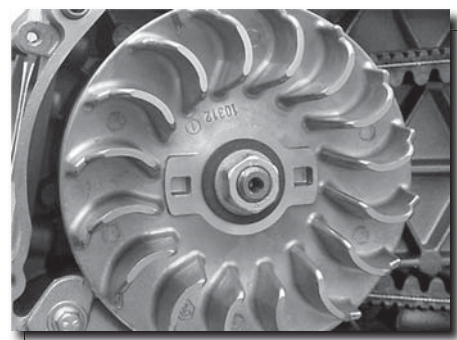


### Specific equipment and tools:

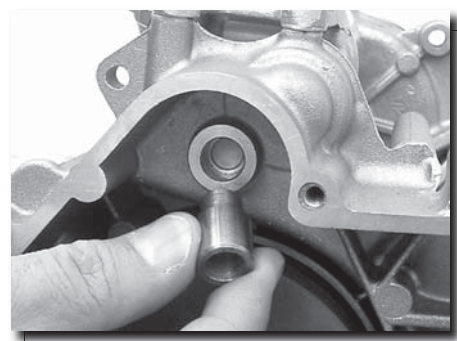
020368Y driving pulley stop wrench

### VERSION 250

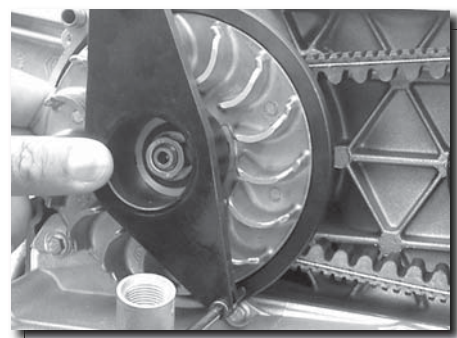
- Turn the driving shaft until the pulley slots are with vertical axis.



- Insert the adaptor shim cylinder of the specific tool into the seat shown in the photo.



- Insert the tool into the slots and apply the bull ring.
- Bring the ring's fixing screws close while keeping the tool resting on the pulley.

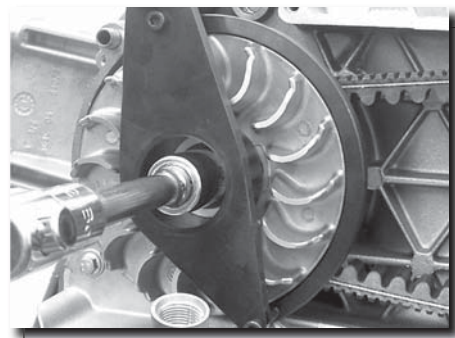


### Specific tooling

020626Y driving pulley stop key

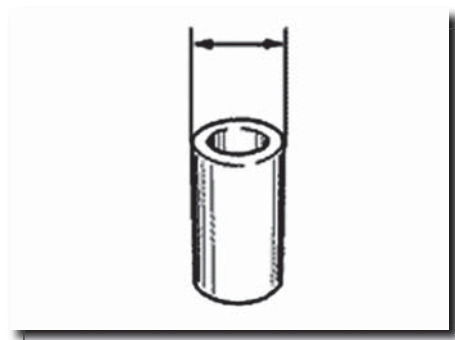
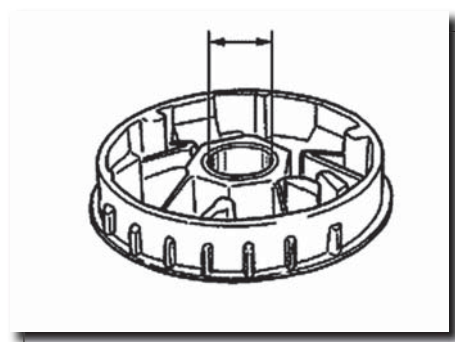
# ENGINE

- Remove the fixing nut and washer.
- Remove the fixed driving half pulley.



## INSPECTING THE ROLLERS CASE

- Ensure the internal bearing, shown in the figure, is not abnormally worn and measure the internal diameter.
- Measure the external diameter of the pulley sliding bushing, shown in the figure.
- Ensure rollers are not damaged or worn.
- Ensure the roller plate shoes are not damaged.
- Check the wear of the roller housings and of the belt contact surfaces on both half-pulleys.
- Ensure the fixed driving pulley exhibits no abnormal wear on the grooved profile and on the belt contact surface.
- Ensure the O-ring is not deformed.



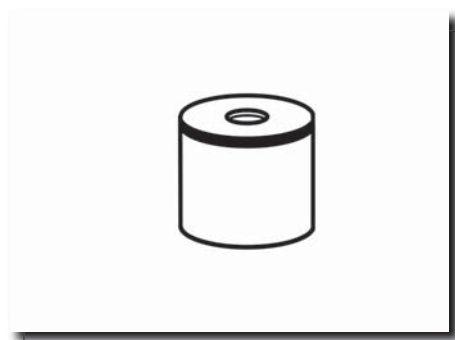
## **CAUTION**

DO NOT LUBRICATE OR CLEAN THE BUSHES.

## **Characteristic**

Mobile driving half pulley brass: Standard Diameter  
26,000 - 26,021 mm

Mobile driving half pulley brass: Max allowed diameter  
26,12 mm



# ENGINE

Sliding shim cylinder: Standard Diameter  
Ø 25,959 - 25,98 mm

Sliding shim cylinder: Min. Allowed diameter  
Ø 25,95 mm

Roller (125cc): Standard diameter  
Ø 18,9 - 19,1 mm

Roller: Standard Diameter  
Ø 20,5-20,7mm

Roller (125cc): Minimum diameter  
Ø 18,5 mm

Roller: Min. Allowed diameter  
Ø 20 mm



## REFITTING THE DRIVING PULLEY

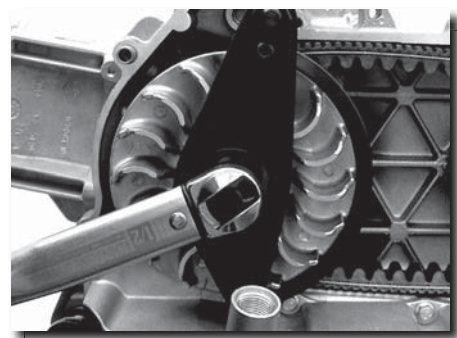
- Mount the steel shim in contact with the shim cylinder and the fixed driving half pulley.
- Install the specific tool as described in the disassembly stage.
- Tighten the nut with washer to the prescribed torque.

### Specific tooling

020626Y driving pulley stop key

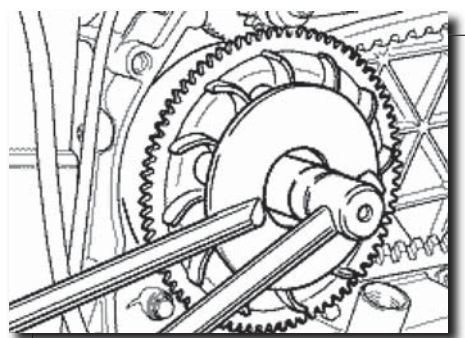
### Locking torques (N\*m)

Driving pulley screw  $75 \div 83$



## Version 125

- Properly reinstall the bendix into its seat, if removed.
- Reinstall the group components (inside shim, fixed half-pulley, outside shim, drive and nut), apply thread-holding Loctite type "Super Rapido" 243 on the threading and tighten the nut at the prescribed torque.
- Prevent the half-pulley rotation using the specific lock wrench.





# ENGINE

- Turn the engine by hand to obtain a minimum tension of the belt.

## CAUTION

IT IS VERY IMPORTANT TO INSTALL THE FIXED DRIVING HALF-PULLEY WITH THE BELT TOTALLY FREE TO PREVENT A FALSE LOCKING OF THE DRIVING HALF-PULLEY.

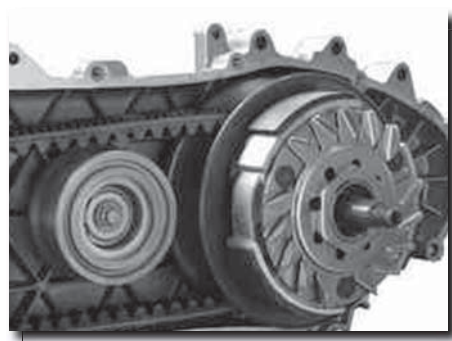
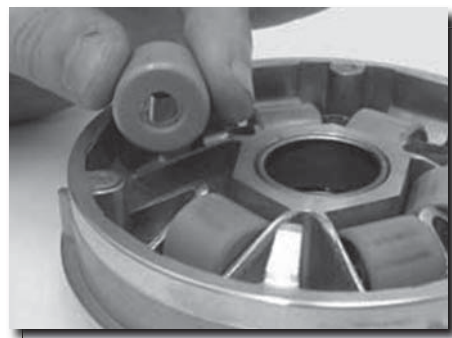
## Specific tooling

020368Y driving pulley stop wrench

## Locking torques (N\*m)

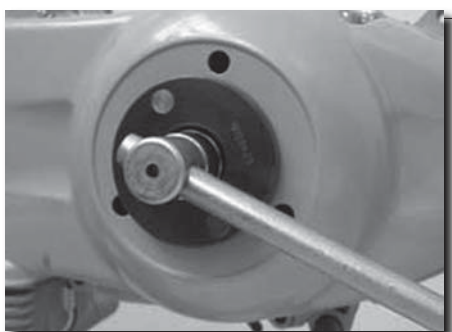
Driving pulley screw  $75 \div 83$

- Pre-assemble the mobile half-pulley with the roller contrast plate, placing the rollers in the specific slits with the larger matching surface in contact with the pulley according to the direction of rotation.
- Check that the roller contact plate exhibits no anomalies or damages on the grooved profile.
- Install the group with the bushing on the driving shaft.
- Install the driven pulley/clutch/belt assembly on the engine.



## REFITTING THE TRANSMISSION COVER

- Check the presence of the 2 centring dowels and the correct installation of the sealing gasket for the oil sump on the transmission cover.
- Replace the cover tightening the 10 screws at the prescribed torque.
- Replace the oil loading cap/bar.



# ENGINE

- Replace the steel washer and the driven pulley nut.
- Tighten the nut at the prescribed torque using the lock wrench and the dynamometric wrench tools.
- Replace the plastic cover.

## Specific tooling

020423Y driven pulley stop key

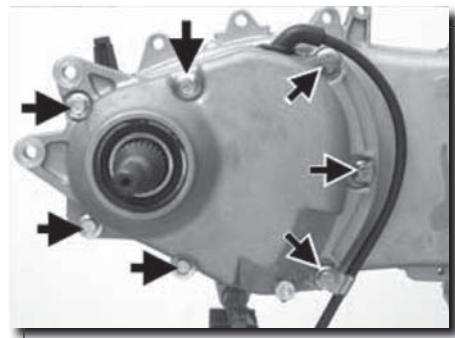
## Locking torques (N\*m)

Cover screws 11-13 Driven pulley axis  $54 \div 60$

## END GEAR

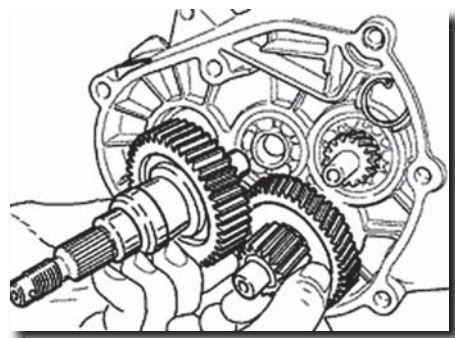
### REMOVING THE HUB COVER

- Drain the rear hub by the oil drainage cap.
- Remove the 7 flanged screws shown in the figure.
- Remove the hub cover and the relevant gasket.



### REMOVING THE WHEEL AXLE

- Remove the wheel axle with gear.
- Remove the intermediate gear.



# ENGINE

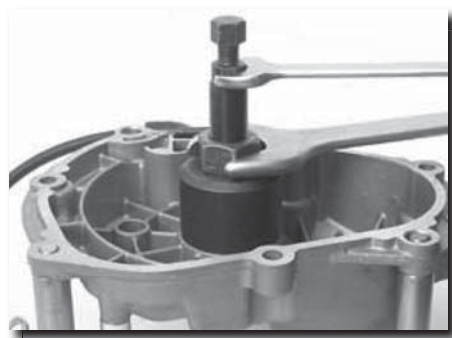
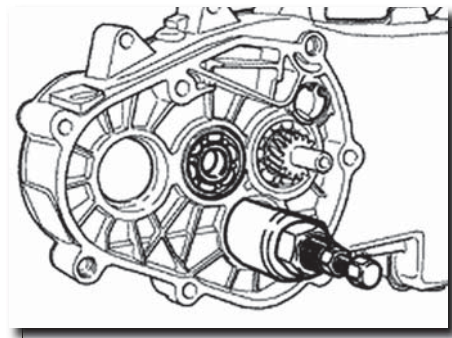
## REMOVING THE HUB BEARINGS

- Check all bearings (wear, clearance and noise). In case of anomalies, proceed as follows.

- To remove the 3 15-mm bearings (2 on the crankcase and 1 on the hub cover) use the specific removing tool.

### Specific tooling

001467Y01315-mm pliers



## REMOVING THE WHEEL AXLE BEARINGS

- Remove the snap ring from the hub cover outside.

- Support the hub cover and eject the bearing.

- Remove the oil guard using the specific tools, as shown in the figure.

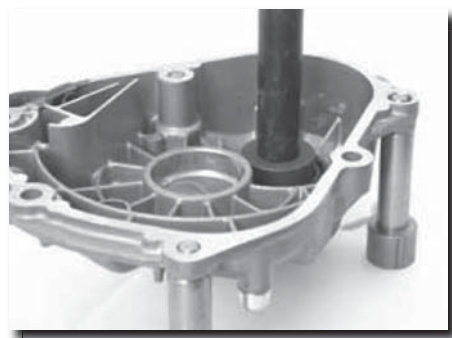
### Specific tooling

020376Y Handle for punches

020477Y Adapter 37 mm

020483Y 30 mm guide

020359Y 42 x 47 mm hub bearing fitting adaptor





# ENGINE

## REMOVING THE DRIVEN PULLEY SHAFT BEARING

- If you have to remove the driven pulley shaft, the relevant bearing and the oil guard, remove the transmission cover and the clutch unit as described before.

- Extract the driven pulley shaft from the bearing.

- Remove the oil guard using a screwdriver from the inside of the bearing, and being careful not to damage the seat, make it slide out from the belt transmission side.

- Remove the snap ring shown in the figure.

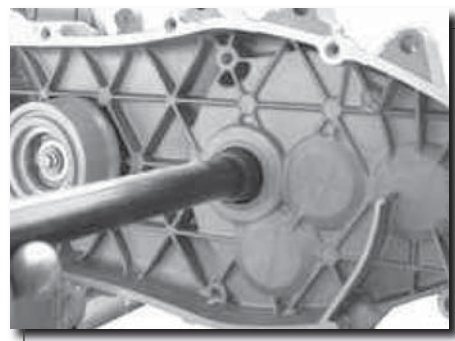
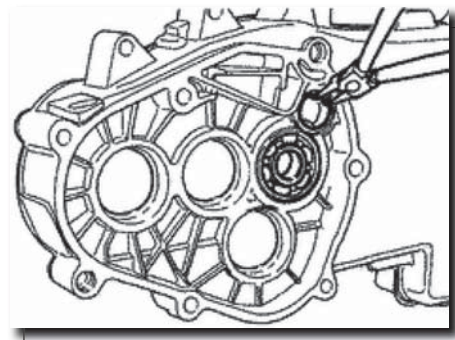
- Remove the driven pulley shaft bearing using the modular punch.

### Specific tooling

020376Y Handle for punches

020375Y Adapter 28 x 30 mm

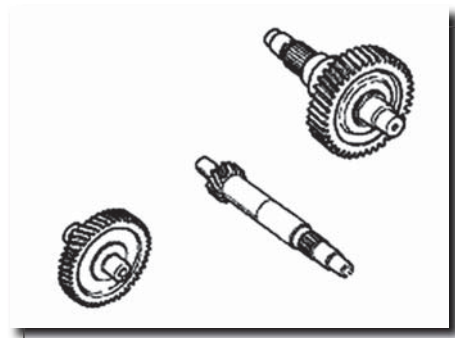
020363Y 20mm guide



## INSPECTING THE HUB SHAFT

- Check that the three shafts exhibit no wear or deformation on the toothed surfaces, at the bearing connections and at the oil guards.

- In case of anomalies, replace the damaged components.



## INSPECTING THE HUB COVER

- Check that the matching surfaces exhibit no deformations.

- Check the bearing connections.

- In case of anomalies, replace the damaged components.

# ENGINE

## REFITTING THE WHEEL AXLE BEARING

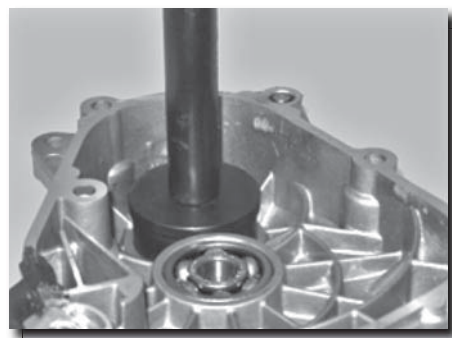
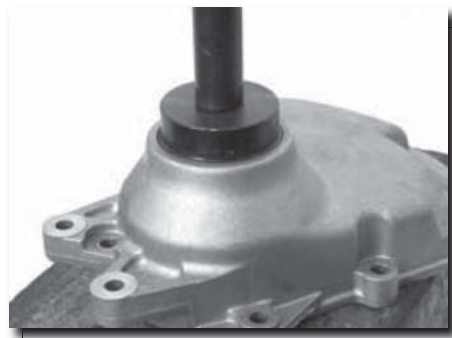
- Place the hub cover on a wooden surface.
  - Warm the cover case by the specific thermal gun.
  - Install the wheel axle bearing using the modular punch as shown in the figure.
  - Install the snap ring.
  - Install the oil guard with the sealing lip facing the inside of the hub and place it flush with the internal surface using the specific tool on the 52 mm side.
- The 52-mm side of the adaptor must face the bearing.

### Specific tooling

020376Y Handle for punches

020360Y 52 x 55 mm adaptor

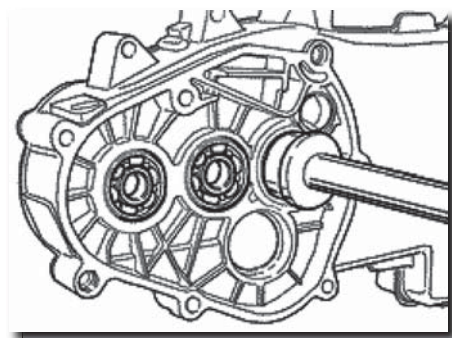
020483Y 30 mm guide



## REFITTING THE HUB COVER BEARINGS

To install the hub box bearings you must warm the engine crankcase and the cover by the specific thermal gun.

- The three 15-mm bearings must be installed using the specific tools: The 42-mm side of the adaptor must face the bearing.



# ENGINE

## Specific tooling

020151 Y Air heater

020376Y Handle for punches

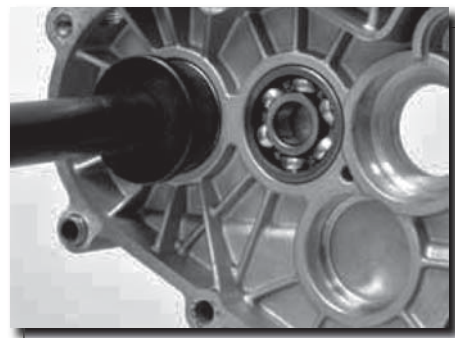
020359Y 42 x 47 mm hub bearing fitting adaptor

020412Y 15 mm guide

## N.B.

TO INSTALL THE BEARING ON THE COVER, SUITABLY SUPPORT THE COVER BY THE COLUMN KIT

Replace the driven pulley axle bearing using the modular punch as shown in the figure.



## N.B.

IF THE BEARING IS OF THE ASYMMETRIC BALL CONTAINMENT TYPE, PLACE IT WITH VISIBLE BALLS ON THE HUB INTERNAL SIDE.

## Specific tooling

020376Y Handle for punches

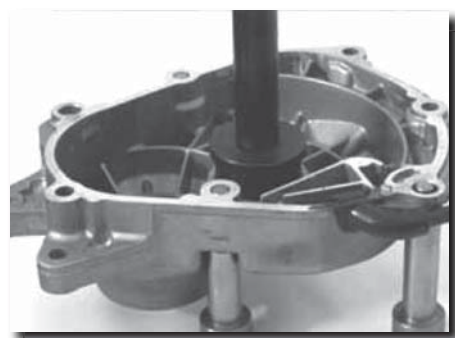
020359Y 42 x 47 mm hub bearing fitting adaptor

020363Y 20mm guide

## N.B.

TO INSTALL THE BEARINGS ON THE ENGINE CRANKCASE THE LATTER SHOULD BE SUPPORTED ON A SURFACE TO ALLOW PLACING THE BEARINGS VERTICALLY.

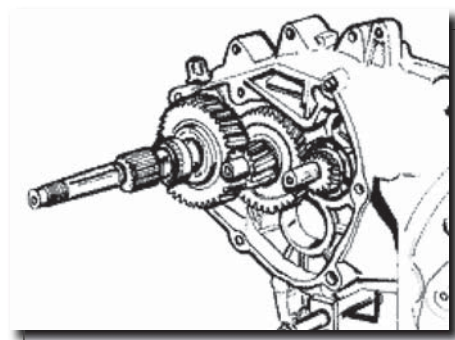
Replace the snap ring placing the opening at the side opposed the bearing and the new oil guard flush with the crankcase on the pulley side.



# ENGINE

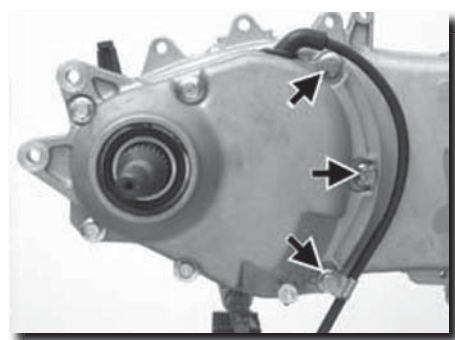
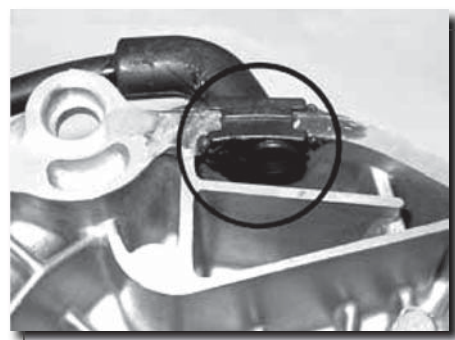
## REFITTING THE HUB BEARINGS

- Install the 3 shafts in the engine crankcase as shown in the figure.



## REFITTING THE HUB COVER

- Install a new gasket with the centring dowels.
- Seal the vent pipe gasket using black silicone sealant.
- Install the cover checking the correct position of the vent pipe.
- Place the 3 shorter screws that can be recognised by the different colour as shown in the figure.
- Fix the vent pipe support bracket using the lower short screw.
- Install the remaining 4 screws and tighten the 7 screws at the prescribed torque.



## Locking torques (N\*m)

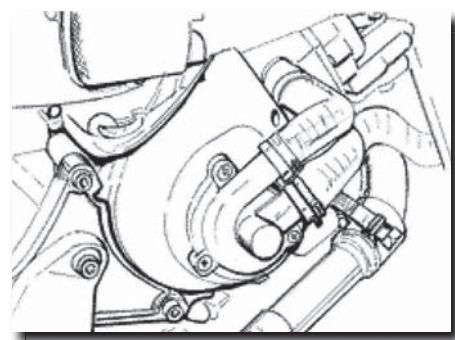
Hub cover screws  $24 \div 27$

## FLYWHEEL COVER

### REMOVING THE HUB COVER

#### Version 125

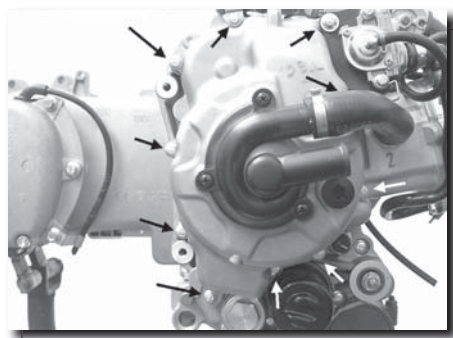
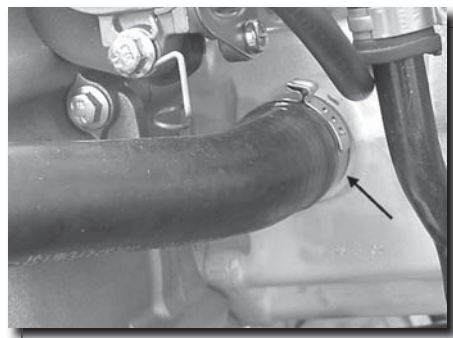
- Remove the two clamps, the two sleeves and empty the cooling system.
- Remove the 4 attachments and the flywheel cover.



# ENGINE

## Version 125

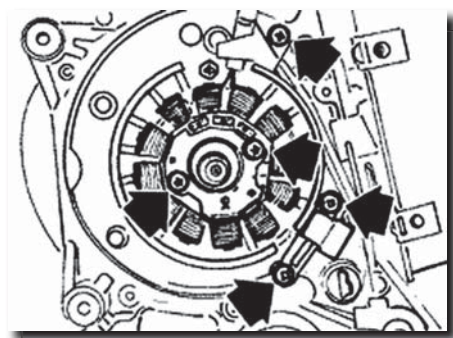
- Remove the clamp fastening the coupling to the cylinder.
- Remove the 10 clamps.
- Remove the flywheel cover.



## REMOVING THE STATOR

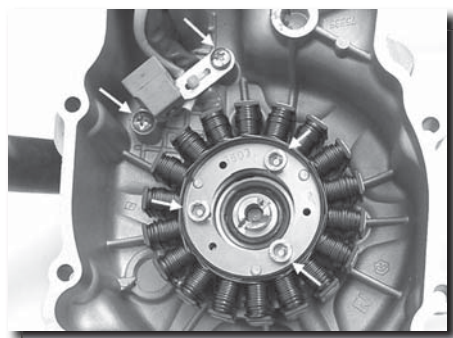
### Version 125

- Remove the oil minimum pressure switch electric terminal.
- Remove the 2 Pick-Up screws and the screw of the wiring fixing bracket, along with the 2 stator fixing screws shown in the figure.
- Remove the stator and its wires.



### Version 250

- Remove the 2 Pick-Up screws and the screw of the wiring fixing bracket, along with the 3 stator fixing screws shown in the figure.
- Remove the stator and its wires.





# ENGINE

## REFITTING THE STATOR

### Version 125

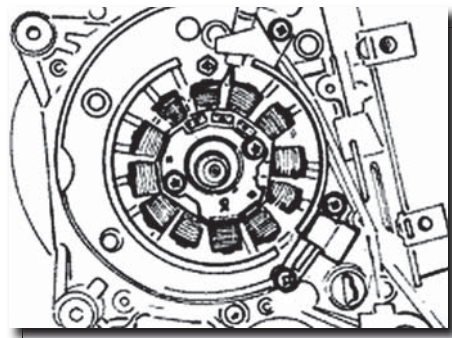
- Replace stator and flywheel performing the operations for removal in the reverse order and tighten the fixing screws at the prescribed torque.
- Place the wiring as shown in the figure.
- Stator and Pick-Up screws

**N.B.**

THE PICK-UP CABLE MUST BE PLACED BETWEEN THE TOP SCREW AND THE REFERENCE DOWEL AS SHOWN IN THE FIGURE.

#### Locking torques (N\*m)

Stator cover screws (°)  $3 \div 4$

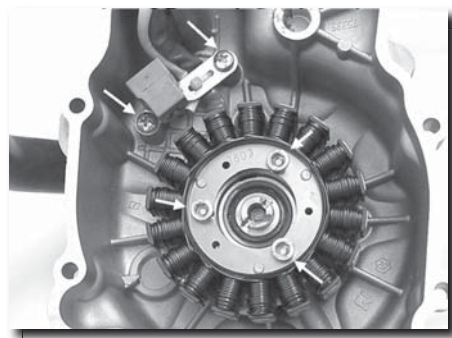


### Version 250

- Replace stator and flywheel performing the operations for removal in the reverse order and tighten the fixing screws at the prescribed torque.

#### Locking torques (N\*m)

Stator cover screws (°)  $3 \div 4$



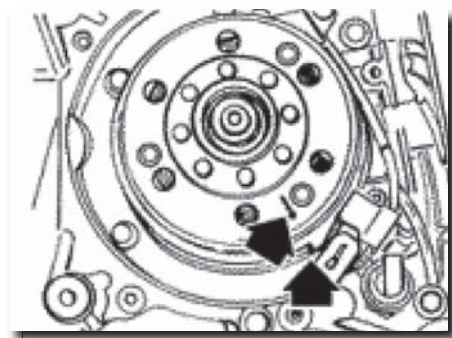
## REFITTING THE FLYWHEEL COVER

### Version 125

- Place the flywheel with the top dead centre reference aligned with the crankcase reference.
- Prepare the flywheel cover by aligning the references between drive and cover case.
- Reinstall the cover on the engine inserting the three columns in the water pump drive.
- Perform the operations for removal in the reverse order.

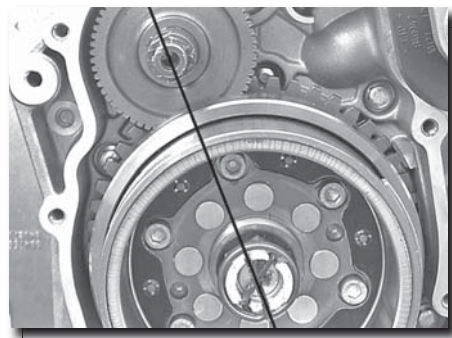
#### CAUTION

CHECK THE PROPER POSITION OF THE FLYWHEEL CONNECTOR. CHECK THE PRESENCE OF THE TWO CENTRING DOWELS.

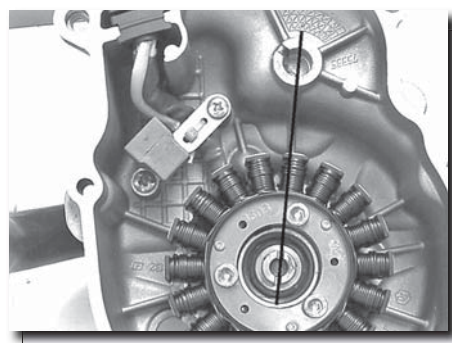


# ENGINE

- Position the keying clamp on the driving shaft and direct the end as shown in the figure.



- Position the water pump shaft by referring to the transmission gear seat as shown in the photo.



- Reassemble the cover on the engine and tighten the screws to the prescribed torque
- Perform the operations for removal in the reverse order.

## CAUTION

CHECK THE PROPER POSITION OF THE FLYWHEEL CONNECTOR. CHECK THE PRESENCE OF THE TWO CENTRING DOWELS.

## Locking torques (N\*m)

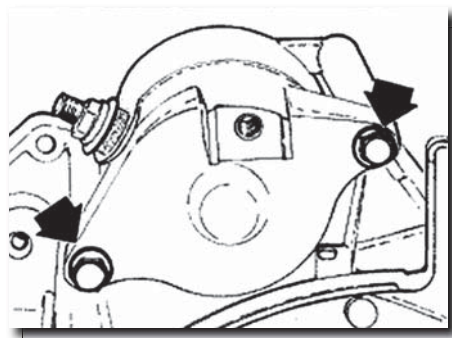
Flywheel cover screws  $11 \div 13$

## FLYWHEEL AND STARTING

### REMOVING THE STARTER MOTOR

#### Version 125

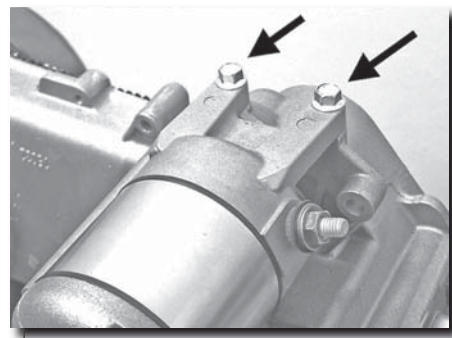
- Remove the two screws shown in the figure
- Extract the motor from its seat



# ENGINE

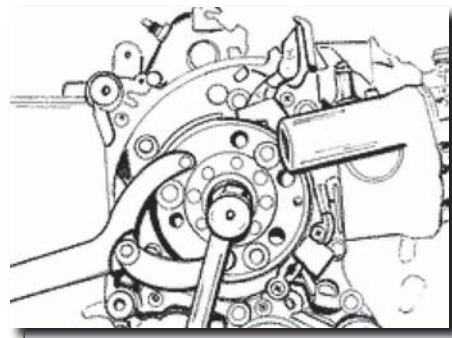
## Version 250

- Remove the two screws shown in the figure.
- Extract the motor from its seat.



## REMOVING THE FLYWHEEL MAGNETO

- Hold the flywheel using the adjustable spanner.
- Remove the lock-nut.
- Extract the flywheel.

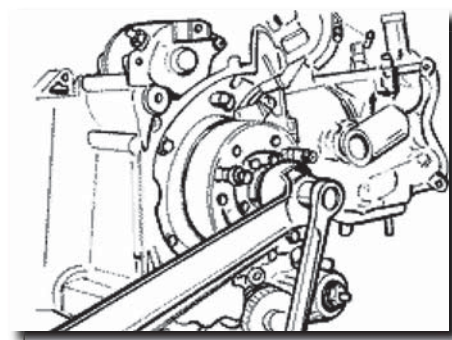


**CAUTION**  
USING A DIFFERENT WRENCH COULD DAMAGE THE STA-  
TOR COILS.

### Specific tooling

020565Y Compass flywheel stop spanner

008564Y Flywheel extractor



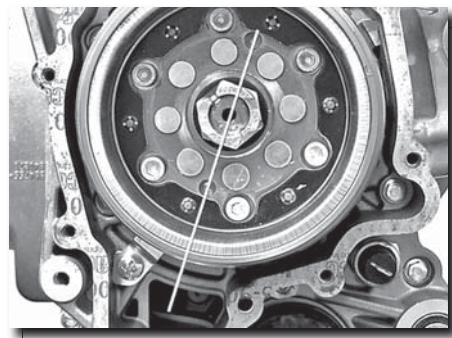
- Remove the water pump shaft and driving shaft keying spring.



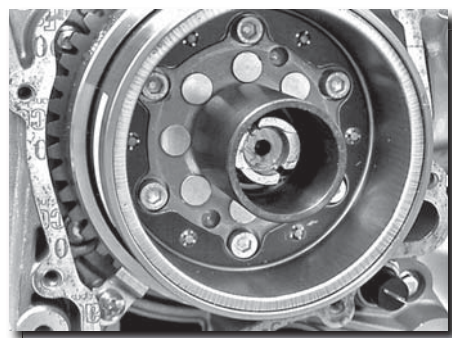


# ENGINE

- Line up the 2 holes on the flywheel as shown in the photo



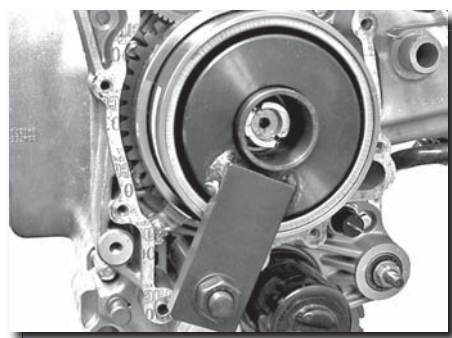
- Tighten the guide shim cylinder that is part of the specific flywheel stop key on the flywheel as shown in the photo.



- Insert the specific flywheel stop key into the flywheel as shown in the photo.

## **Specific tooling**

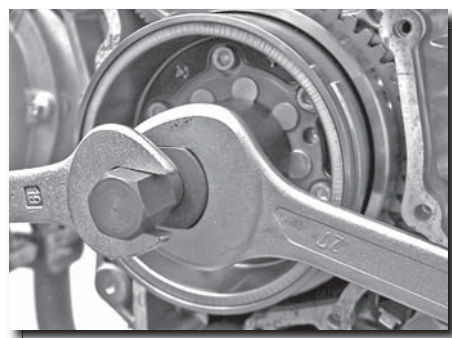
020627Y flywheel stop key.



- Remove the flywheel fixing nut with relative washer
- Screw back on the flywheel fixing nut by 3 or 4 threads so that the flywheel does not accidentally fall during extraction
- Screw the extractor on the flywheel and extract as shown in the photo

## **Specific tooling**

020467Y Flywheel extractor



# ENGINE

## INSPECTING THE FLYWHEEL COMPONENTS

- Check the integrity of the internal plastic parts of the flywheel and the Pick-Up control plate.

## REFITTING THE FLYWHEEL MAGNETO

- Install the flywheel being careful to the proper introduction of the key.
- Tighten the flywheel nut at the prescribed torque.
- Check that the Pick-Up air gap ranges between  $0.34 \div 0.76$  mm.
- The Pick-Up assembly requires no gap adjustment.
- Different values are caused by deformations of the Pick-Up support.

### **N.B.**

A VARIATION IN THE GAP DISTANCE CHANGES THE MINIMUM DELIVERY SPEED OF THE IGNITION SYSTEM.

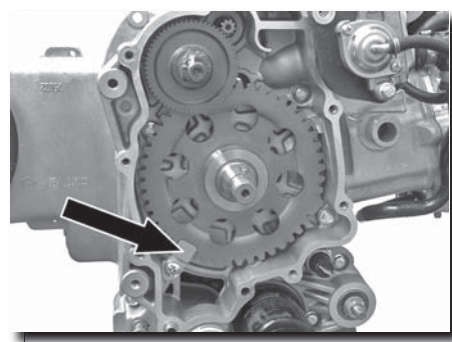
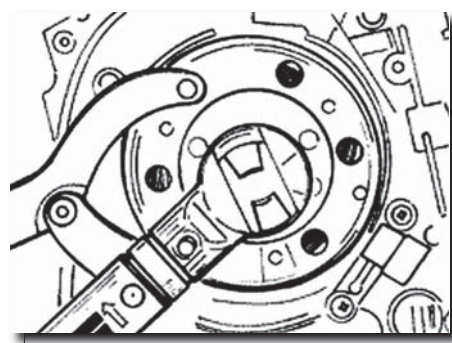
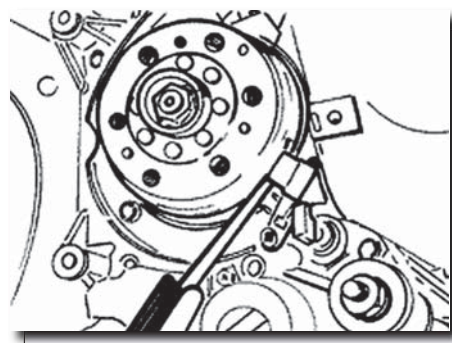
### **Specific tooling**

020565Y Compass flywheel stop spanner

### **Locking torques (N\*m)**

Flywheel nut  $54 \div 60$

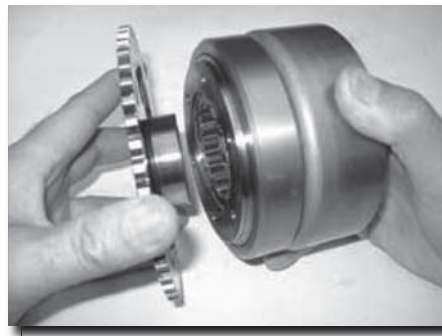
- Remove the free wheel retaining plate shown in the picture.
- Remove the intermediate gear and the free wheel.



# ENGINE

- Insert the free wheel on the flywheel as shown in the picture.

- Hence refit the flywheel with the intermediate gear and the free wheel.



- Using the special flywheel retaining tool, tighten the lock-nut to the prescribed torque.

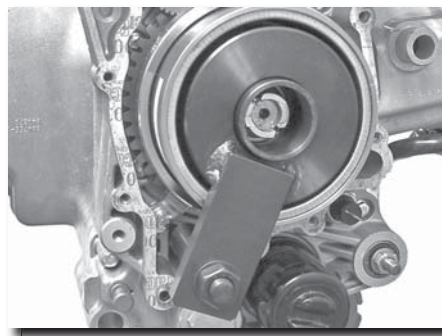
- Refit the retaining plate.

## Specific tooling

020627Y flywheel stop key

## Locking torques (N\*m)

Flywheel lock-nut  $94 \div 102$



## REFITTING THE STARTER MOTOR

### Version 250

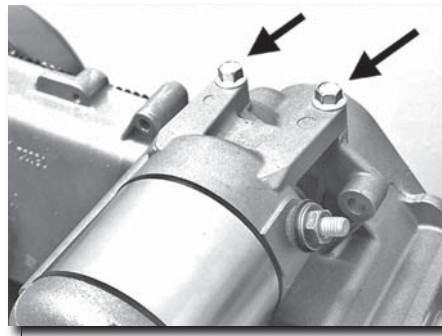
- Install a new O-Ring on the starter motor and lubricate it.

- Install the starter motor on the engine crankcase and tighten the 2 screws at the prescribed torque.

- Replace the remaining parts as described in the Timing head cylinder, lubrication, flywheel and transmission chapters.

## Locking torques (N\*m)

Starter motor screws  $11 \div 13$



### Version 125

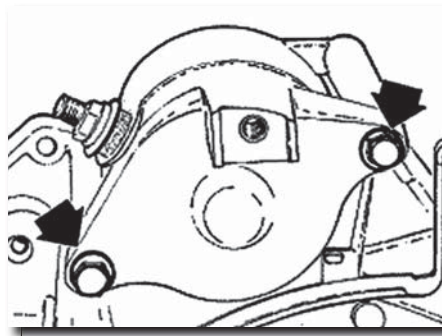
- Install a new O-Ring on the starter motor and lubricate it.

- Install the starter motor on the engine crankcase and tighten the 2 screws at the prescribed torque.

- Replace the remaining parts as described in the Timing head cylinder, lubrication, flywheel and transmission chapters.

## Locking torques (N\*m)

Starter motor screws  $11 \div 13$



# ENGINE

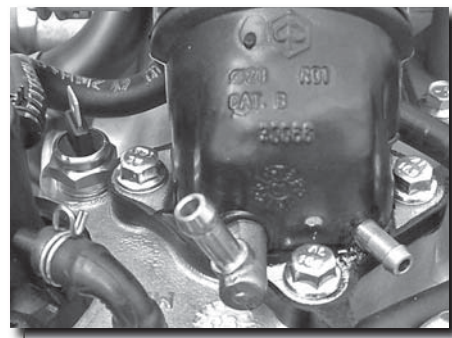
## **CYLINDER ASSY. AND TIMING SYSTEM**

### **REMOVING THE INTAKE MANIFOLD**

- Remove the flywheel cover as described in the Flywheel cover chapter.
- Loosen the 3 screws and remove the intake manifold.

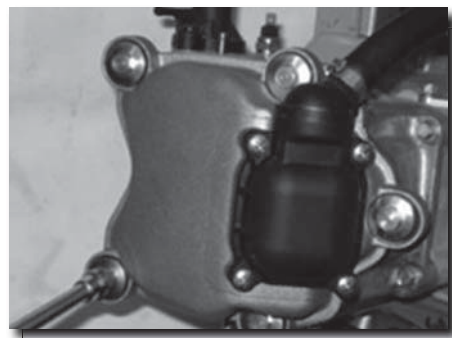
#### **N.B.**

VERSION 125 CC IS PROVIDED WITH ANTITAMPERING SCREWS.



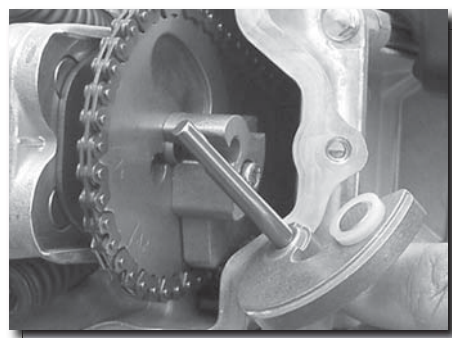
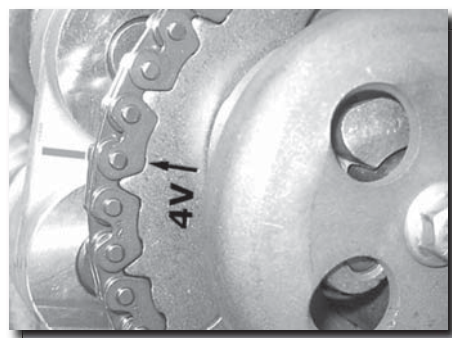
### **REMOVING THE ROCKER-ARMS COVER**

Remove the 5 screws shown in the figure.



### **REMOVING THE TIMING SYSTEM DRIVE**

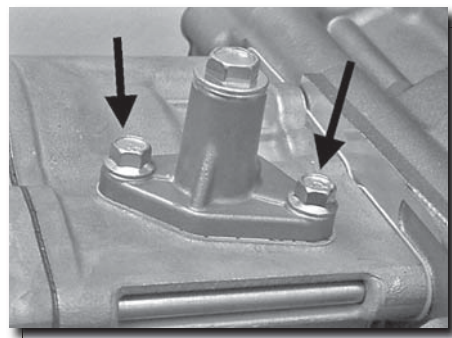
- Remove all of the parts below: transmission cover, driving pulley with belt, start-up pinion, oilsump with spring and by-pass piston, oil pump pulley cover, O-Ring on the driving shaft and pinion separating washer.
- Remove the tappet cover.
- Remove the central screw and the valve lifting mass stop bell shown in the figure.
- Remove the return spring of the automatic valve lifting mass, the valve lifting mass with relevant travel end washer.



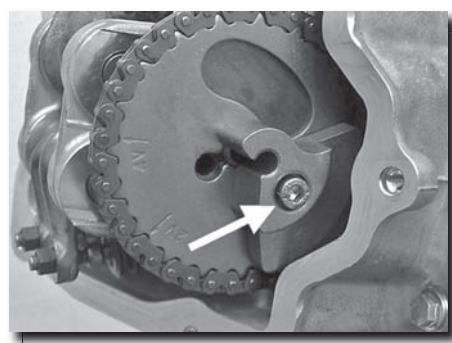


# ENGINE

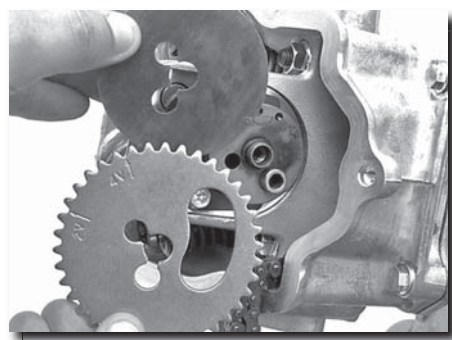
- Loosen the tightener central screw.
- Remove the 2 attachments shown in the figure.
- Remove the tightener with relevant gasket.



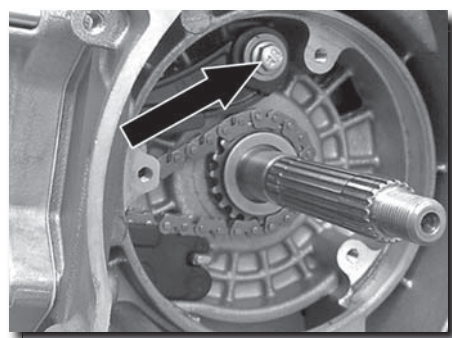
- Remove the inside hexagon screw and the balance weight shown in the figure.



- Remove the camshaft control pulley and the relevant washer.



- Remove the control pinion and the timing belt.
- Remove the screw shown in the figure, the spacer and the tightener sliding block.  
The tightener sliding block must be removed from the transmission side. As regards the lower chain guiding sliding block, it can only be removed after the head removal.



**N.B.**  
IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

# ENGINE

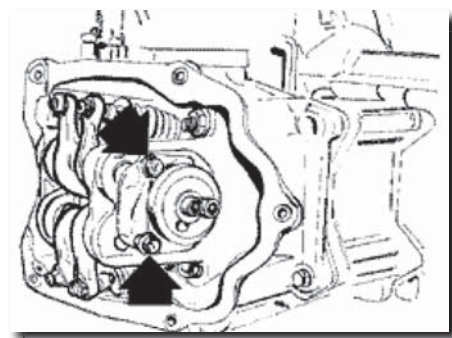
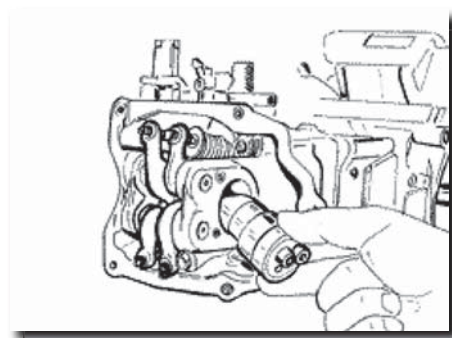
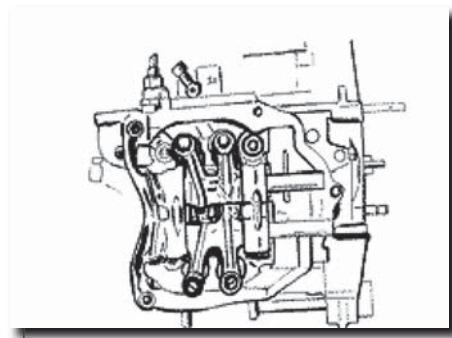
## REMOVING THE CAM SHAFT

- Remove the 2 screws and the camshaft fixing bracket shown in the figure.
- Remove the camshaft.
- Remove pins and rockers by the flywheel side holes.

### N.B.

IN CASE OF NEED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS, ROCKERS AND FIXING BRACKET.

THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.

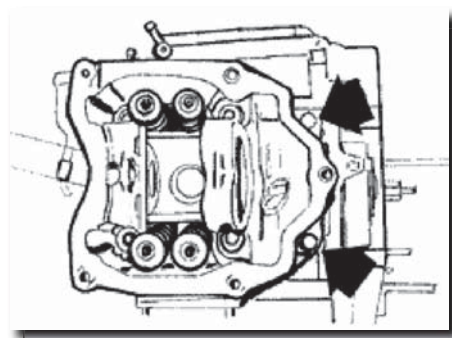


## REMOVING THE CYLINDER HEAD

- Remove the spark plug.
- Remove the 2 side attachments shown in the figure.
- Loosen the 4 head-cylinder fastening nuts in 2 or 3 times and in a crossed sequence.
- Remove the head, the 2 centring dowels and the gasket.

### N.B.

IN CASE OF NEED, THE HEAD MAY BE REMOVED WITH THE CAMSHAFT, PINS, ROCKERS AND FIXING BRACKET. THE HEAD CAN ALSO BE REMOVED WITHOUT REMOVING THE CHAIN AND THE DRIVING SHAFT CHAIN TIGHTENER.



# ENGINE

## REMOVING THE VALVES

- Using the specific tool with adapter, remove half-cones, plates, springs and valves.
- Remove the oil guards by the specific tool.
- Remove the lower spring supports.

### CAUTION

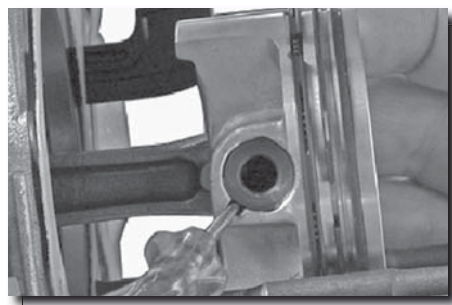
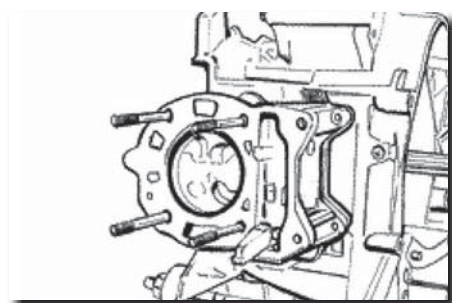
PLACE THE VALVES SO AS TO RECOGNISE THEIR ORIGINAL POSITION ON THE HEAD.

### Specific tooling

020382Y011 Bushing (valve remover)

020382Y Tool for removing valve cotters equipped with part 012

020306Y Valve sealing ring drift



## REMOVING THE CYLINDER - PISTON ASSY

### Cylinder and piston removal

- Remove the chain guide sliding block.
- Extract the cylinder.
- Remove the cylinder base gasket.
- Remove the 2 lock rings, the pin and the piston.
- Remove the piston sealing rings.

### CAUTION

BE CAREFUL NOT TO DAMAGE THE SEALING RINGS DURING REMOVAL

### N.B.

TO PREVENT DAMAGES TO THE PISTON, SUPPORT IT WHILE REMOVING THE CYLINDER.

# ENGINE

## INSPECTING THE SMALL END

- Using a micrometer, measure the connecting rod small end diameter.

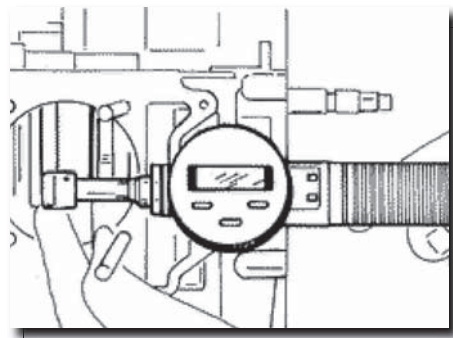
### N.B.

IF THE CONNECTING ROD SMALL END DIAMETER EXCEEDS THE STANDARD DIAMETER, EXHIBITS WEAR OR OVERHEATING, PROCEED TO REPLACE THE DRIVING SHAFT.

### Characteristic

Checking the connecting rod small end: Maximum diameter 15.030mm

Checking the connecting rod small end: Standard diameter 15.015-15.025mm



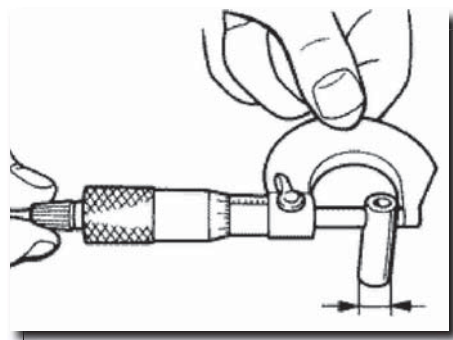
## INSPECTING THE WRIST PIN

- Check the pin outside diameter.
- Calculate the coupling clearance between pin and connecting rod end.

### Characteristic

Piston pin diameter : Standard clearance  $0,015 \div 0,029$  mm

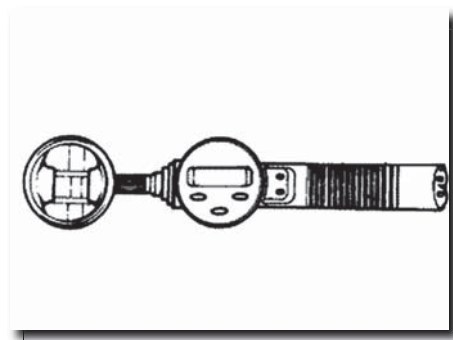
Piston pin diameter : Standard diameter 14,996÷15,000 mm



## INSPECTING THE PISTON

### Version 125

- Measure the diameter of the wrist pin housing on piston.
- Estimate the clearance between wrist pin and piston.
- Measure the external diameter of the piston, perpendicular to the wrist pin diameter.
- Take this measurement at 41.1 mm from the piston crown, in the position shown in the figure.
- Clean the piston ring grooves thoroughly.





# ENGINE

- Using appropriate feeler gauges, measure the clearance between piston rings and grooves, as shown in the figure.

- If such clearances exceed the limits given in the table below, replace the piston.

## N.B.

THE HOUSINGS OF THE PIN HAVE TWO LUBRICATION CHANNELS. FOR THIS REASON MEASUREMENT OF THE DIAMETER MUST BE CARRIED OUT ACCORDING TO THE AXIS OF THE PISTON.

## Characteristic

Diameter of pin seat on piston : Standard diameter  
15,001 -15,006mm

Diameter of pin seat on piston : Standard clearance  
0,001 -0,010mm

Piston pin diameter: Piston 125  
56,945 - 56,973 mm

## Fitting clearance

**1° segment - connection game standard**  
0,025 ÷ 0,07 mm

**1° segment - the admitted maximum game after the use**  
0,08 mm

**2nd lining - Standard coupling clearance**  
0,015 ÷ 0,06 mm 2° aro

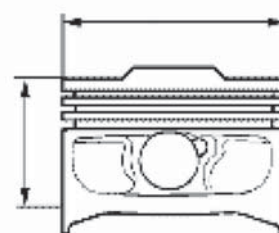
**2nd lining - Admissible clearance after use**  
0,07 mm rascador de aceite

**Standard coupling clearance**  
0,015 ÷ 0,06 mm rascador de

**Admissible clearance after use**  
0,07 mm

## Version 250

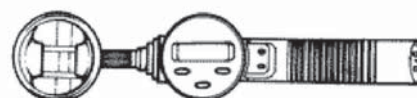
- Measure the diameter from the pin seat on the piston.
- Calculate the piston pin coupling clearance.
- Measure the external diameter of the piston according to a direction at a right angle to the pin's axis.



**125**

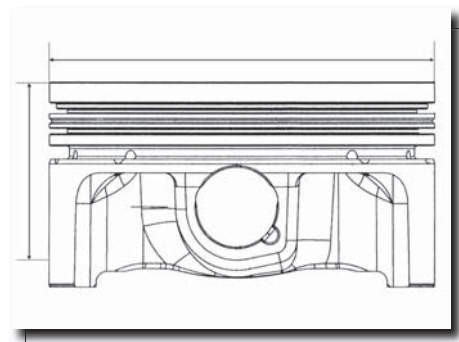


**125 cc**



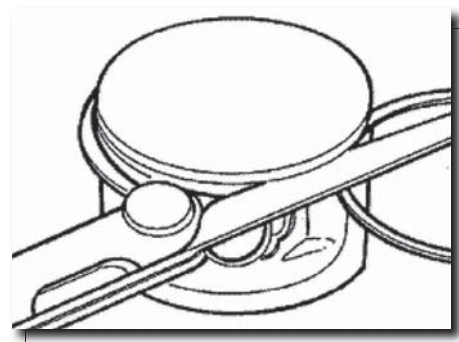
# ENGINE

- Take the measurement 5 mm from the base in the position shown in the figure.
- Carefully clean the sealing ring housings.
- Using suitable probes, measure the coupling clearance between sealing rings and piston housings, as shown in the figure.
- If higher clearance values than those reported in the table are measured, replace the piston.



**N.B.**  
MEASURE THE CLEARANCE BY INSERTING THE BLADE OF THE THICKNESS GAUGE FROM THE SIDE OF THE SECOND GAS RING

**N.B.**  
THE HOUSINGS OF THE PIN HAVE TWO LUBRICATION CHANNELS. FOR THIS REASON MEASUREMENT OF THE DIAMETER MUST BE CARRIED OUT ACCORDING TO THE AXIS OF THE PISTON.



## Characteristic

Diameter of pin seat on piston : Standard diameter  
15,001 ÷ 15,006 mm

Diameter of pin seat on piston : Standard clearance  
0,001 ÷ 0,010 mm

Piston diameter  
71,953 ÷ 71,981 mm

## FITTING CLEARANCE

**1st lining - Standard coupling clearance**  
0,015 ÷ 0,06 mm

**1st lining -Admissible clearance after use**  
0,07 mm

**2nd lining - Standard coupling clearance**  
0,015 ÷ 0,06 mm

**2nd lining - Admissible clearance after use**  
0,07 mm Scraper ring

**Standard coupling clearance**  
0,015 ÷ 0,06 mm Scraper ring

**Admissible clearance after use**  
0,07 mm

# ENGINE

## INSPECTING THE CYLINDER

### Version 250

- Using a bore gauge, measure the internal diameter of the cylinder following the directions given in the figure and at three different heights.
- Check that the plane of coupling with the head does not show wear or deformations.
- The pistons and cylinders are classified with categories depending on the diameters. The coupling is carried out matched (A-A, B-B, C-C, D-D).

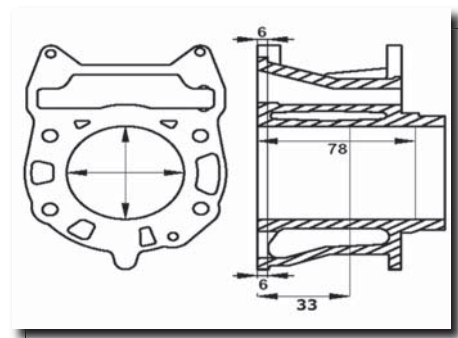
#### Characteristic

cylinder: standard diameter

71,990 ÷ 72,018 mm (a 33 mm)

Maximum allowable runout:

0,05 mm



### Version 125

- Using a bore measuring device, measure the cylinder bore in the directions shown in the figure and at three different heights.
- Ensure there are no signs of wear or deformation on the surface of the cylinder that mates with the cylinder head.
- Pistons and cylinders are categorised according to their diameter. Pistons should match with cylinders of the same classification (A-A, B-B, C-C, and D-D).
- Cylinder re-bores must be carried out respecting the original matching angle on the bored surface of the cylinder.
- The surface roughness of the bored surface of the cylinder should be 0.9 micron.
- This is necessary in order to ensure the proper bedding-in of the piston rings, thus reducing oil consumption and providing optimum performance.
- 1st, 2nd and 3rd over-sized pistons are available as spare parts, for re-bored cylinders, corresponding to 0.2, 0.4 and 0.6 mm over-sizes, respectively. There are four categories for matching oversize cylinders (A-A, B-B, C-C, and D-D).

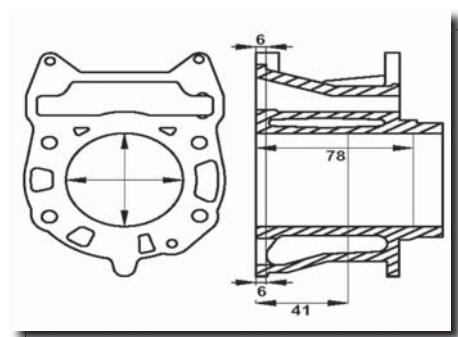
#### Characteristic

cylinder: diameter standard

56,997 ÷ 57,025 mm (a 41 mm)

Maximum allowable runout:

0,05 mm



# ENGINE

## INSPECTING THE PISTON RINGS

### Version 125

#### Seal rings

- Insert each of the three piston rings in turn, inside the cylinder where it still maintains its original diameter, making sure they are perpendicular to the cylinder axis.
- Measure the piston ring gap (see figure) using feeler gauges.
- Replace piston rings exhibiting a gap exceeding the specified limit.

#### N.B.

BEFORE REPLACING THE LININGS, MAKE SURE THAT THE PRESCRIPTIONS RELATING TO THE SEALING RING - HOUSINGS AND PISTON - CYLINDER COUPLING CLEARANCES ARE RESPECTED. IN ANY CASE, NEW SEALING RINGS COUPLED WITH A SECOND-HAND CYLINDER MAY REQUIRE ADJUSTMENT CONDITIONS DIFFERENT FROM STANDARD ONES.

#### Characteristic

##### 1st lining

Standard opening:  
 $0,15 \div 0,30$  mm

##### 2nd lining

Standard opening:  
 $0,10 \div 0,30$  mm

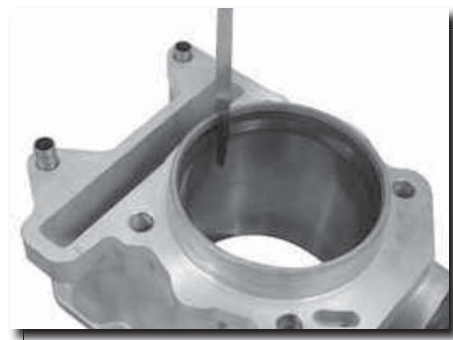
##### Scraper ring

Standard opening:  
 $0,15 \div 0,35$  mm

### Version 250

#### Sealing rings

- Alternately insert the 3 sealing rings into the cylinder in the zone where it has the original diameter. Insert the rings in orthogonal position into the cylinder axle, using the piston.
- Measure the opening (see figure) of the sealing rings by a thickness gauge.
- If higher values than those prescribed are measured, replace the linings.



# ENGINE

## N.B.

BEFORE REPLACING THE LININGS, MAKE SURE THAT THE PRESCRIPTIONS RELATING TO THE SEALING RING - HOUSINGS AND PISTON - CYLINDER COUPLING CLEARANCES ARE RESPECTED. IN ANY CASE, NEW SEALING RINGS COUPLED WITH A SECOND-HAND CYLINDER MAY REQUIRE ADJUSTMENT CONDITIONS DIFFERENT FROM STANDARD ONES.

## Characteristic

### 1st lining

Standard opening:  
 $0,15 \div 0,30$  mm

### 2nd lining

Standard opening:  
 $0,20 \div 0,40$  mm

### Scraper ring

Standard opening:  
 $0,20 \div 0,40$  mm



## REMOVING THE PISTON

- Refit piston and wrist pin on connecting rod with the arrow stamped on the piston crown pointing towards the exhaust.

- Position the wrist pin spring clip on the special tool.

- With the opening in the position shown on the tool.

**S** = Left

**D** = Right

- Correctly position the clip using the drift.

- Install the clip using the drift as shown in the figure.



## N.B.

THE TOOL FOR INSTALLING THE LOCKING RINGS MUST BE USED MANUALLY.

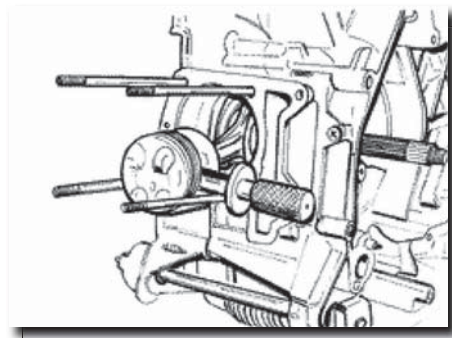
## CAUTION

USING A HAMMER MAY DAMAGE THE LOCK HOUSINGS

## Specific tooling

020454Y Pin retainers installation tool

020430Y Pin retainers installation tool (Engine 125cc)



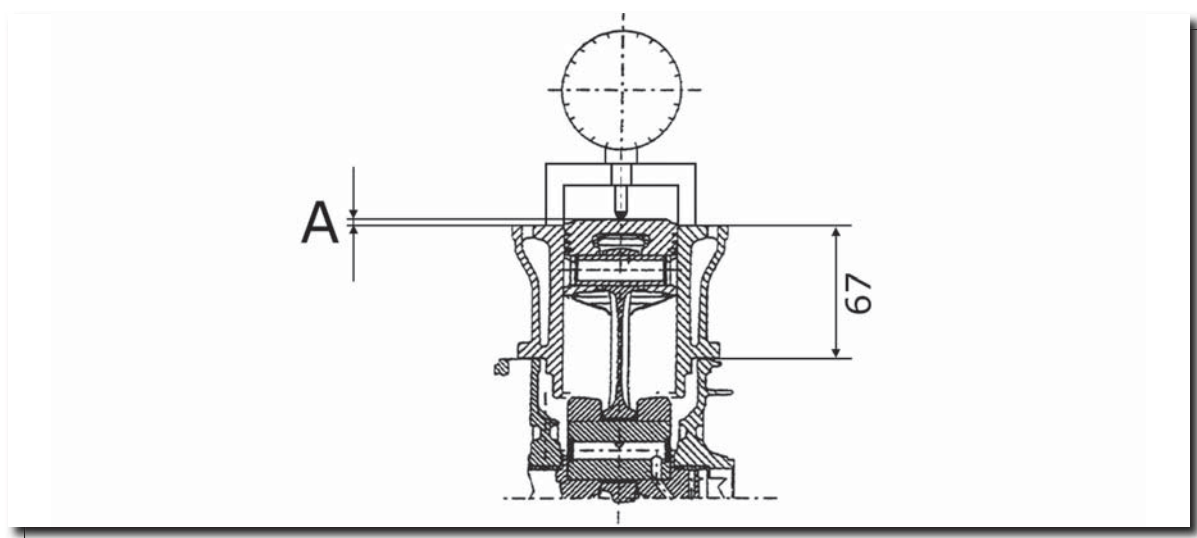
# ENGINE

## CHOOSING THE GASKET

### Characteristic

Compression ratio - 125cc version

Re:  $11,50 \div 13:1$



The length «A» to be measured refers to the piston protrusion. It indicates the amount by which the surface formed by the piston crown tops the surface formed by the upper part of the cylinder. The more the piston descends into the cylinder, the less the base gasket to be applied (to recover the compression ratio) will be and vice versa.

### N.B.

THE MEASUREMENT OF «A» MUST BE CARRIED WITH THE PISTON AT THE TDC, WITHOUT ANY GASKET INSTALLED BETWEEN THE CRANKCASE AND THE CYLINDER, AND AFTER RESETTING THE COMPARATOR, COMPLETE WITH SUPPORT, ON A RECTIFIED SURFACE.

## 125CC VERSION WITH FIBRE HEAD GASKET (1.1)

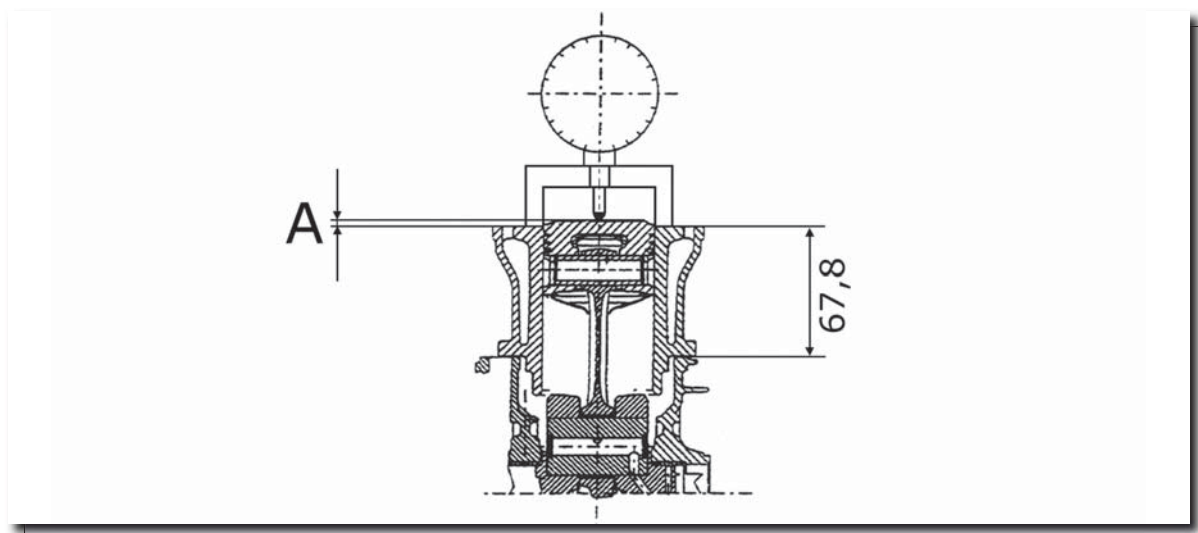
NAME	MEASURE A	THICKNESS
Thicknesses 125	$2,20 \div 2,45$	$0,4 \pm 0,05$
Thicknesses 125	$2,45 \div 2,70$	$0,6 \pm 0,05$

# ENGINE

## Characteristic

Compression ratio - 125cc version

Re:  $11,50 \div 13:1$



The length «A» to be measured refers to the piston protrusion. It indicates the amount by which the surface formed by the piston crown tops the surface formed by the upper part of the cylinder. The more the piston descends into the cylinder, the less the base gasket to be applied (to recover the compression ratio) will be and vice versa.

## N.B.

THE MEASUREMENT OF «A» MUST BE CARRIED WITH THE PISTON AT THE TDC WITHOUT ANY GASKET INSTALLED BETWEEN THE CRANKCASE AND THE CYLINDER, AND AFTER RESETTING THE COMPARATOR, COMPLETE WITH SUPPORT, ON A RECTIFIED SURFACE.

## 125CC VERSION WITH METALLIC HEAD GASKET (0.3)

NAME	MEASURE A	THICKNESS
Thicknesses 125	$1,40 \div 1,65$	$0,4 \pm 0,05$
Thicknesses 125	$1,65 \div 1,90$	$0,6 \pm 0,05$

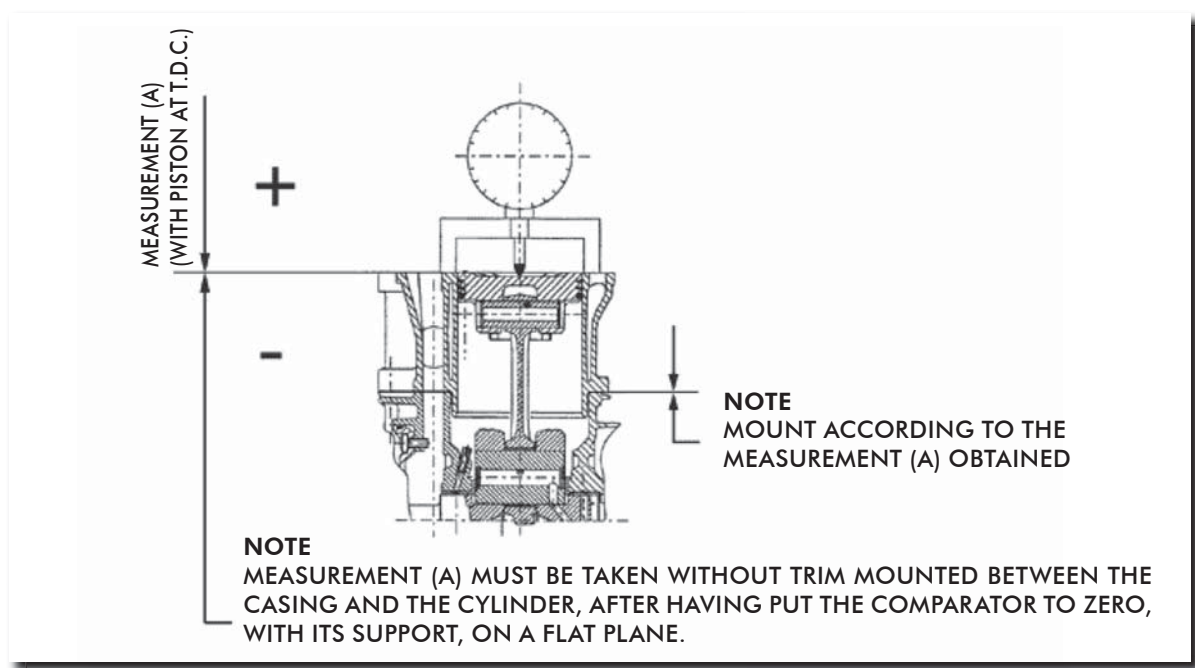
# ENGINE

## COMPRESSION RATIO VERSION 250

### Characteristic

Compression ratio version 250

Rc: 10,5 ÷ 11,5



### N.B.

THE MEASURE «A» TO TAKE IS A PISTON PROTRUSION VALUE THAT INDICATES HOW MUCH THE PLANE FORMED BY THE PISTON TOP PROTRUDES FROM THE PLANE FORMED BY THE TOP OF THE CYLINDER. THE MORE THE PISTON PROTRUDES FROM THE CYLINDER, THE MORE THE BASE GASKET TO APPLY (TO RECOVER THE COMPRESSION RATIO) AND VICE VERSA.

## SHIMMING 250

NAME	MEASURE A	THICKNESS
Shimming 250	2,60 ÷ 2,50	0,4 ± 0,05
Shimming 250	2,50 ÷ 2,30	0,6 ± 0,05
Shimming 250	2,30 ÷ 2,20	0,8 ± 0,05



# ENGINE

## REFITTING THE PISTON RINGS

### Sealing ring assembly

- Place the scraper ring spring on the piston.
- Install the scraper ring keeping the opening opposed to the spring junction and with the writing "top" facing upwards. In any case, the chamfering must be arranged towards the piston top.
- Fit the 2nd sealing lining with the identification letter or the writing "top" facing the piston top. In any case, the step must be facing opposite the piston top.
- Fit the first sealing lining with the top writing or the reference facing the piston top.
- Misalign the lining openings at 120° as shown in the figure.
- Lubricate the parts with engine oil.
- The engine 250 uses the first compression lining with an L section.

#### N.B.

THE 2 SEALING LININGS HAVE A CONICAL SURFACE OF CONTACT WITH THE CYLINDER. THIS IS TO ENSURE A BETTER ADAPTATION.

## REFITTING THE CYLINDER

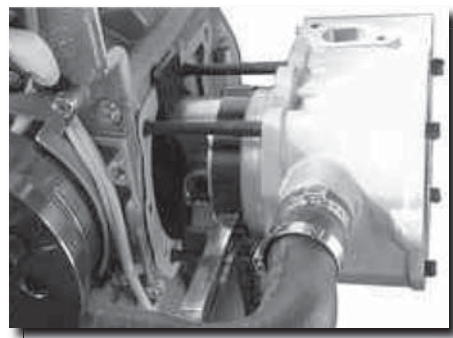
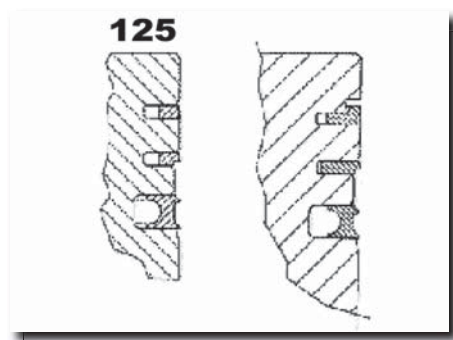
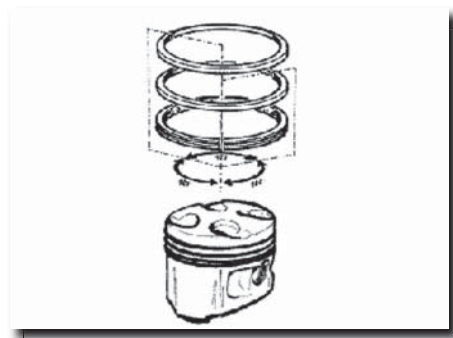
- Fit the cylinder base gasket with the previously determined thickness.
- Using the fork support and the piston ring retaining band, install the cylinder as shown in the figure.

#### N.B.

BEFORE INSTALLING THE CYLINDER, CAREFULLY BLOW THE LUBRICATION DUCT AND LUBRICATE THE CYLINDER LINER.

### Specific tooling

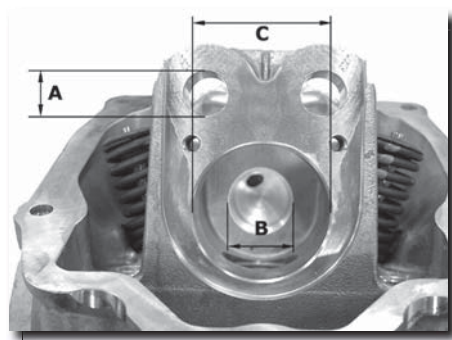
- 020426Y Piston fitting fork
- 020393Y Piston band clamps (Engine 200 - 250 cc)
- 020287Y Piston band clamps (Engine 125cc)



# ENGINE

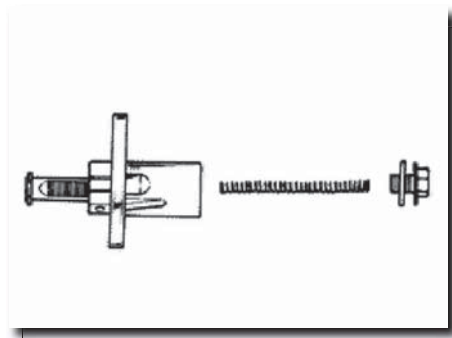
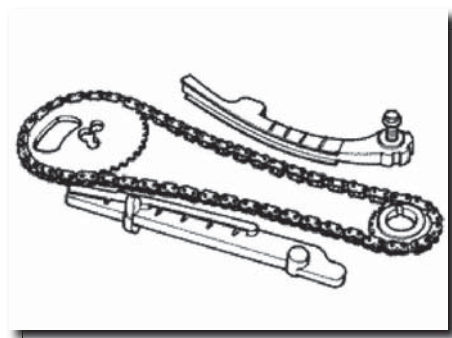
## INSPECTING THE CYLINDER HEAD

- Using a rectified bar and a thickness gauge, check that the head surface exhibits no deformations or wear.
- Check that the camshaft and the rocker pin capacities exhibit no wear.
- Check that the head cover, the exhaust manifold and the intake manifold surface exhibits no wear.



## INSPECTING THE TIMING SYSTEM COMPONENTS

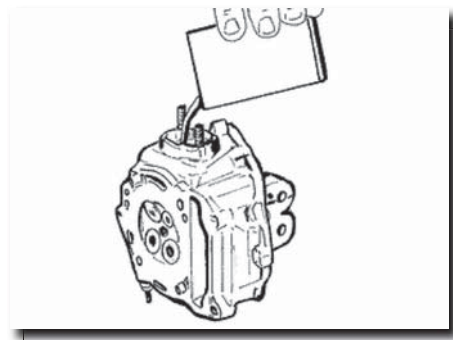
- Check that the guide sliding block and the tightening sliding block are not too worn.
- Check that the camshaft and pinion control pulley chain unit exhibit no wear.
- In case of wear, replace the parts. In case of wear of the chain, pinion and pulley, replace the entire unit.
- Remove the central screw with the washer and the tightener spring. Check that the unidirectional gear is not worn.
- Check the integrity of the tightener spring.
- In case of wear, replace the entire assembly.



# ENGINE

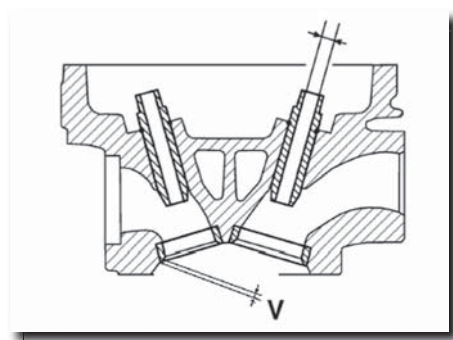
## INSPECTING THE VALVE SEALINGS

- Insert the valves into the head.
- Alternately test the intake and exhaust valves.
- The test should be carried out by filling the manifold with fuel and checking that the head does not bleed from the valves, when pressed by your fingers only.



## INSPECTING THE VALVE HOUSINGS

- Check the width of the impression on the valve seat «V»; max wear limit 1.6 mm.
- Clean the valve guides of any carbon residues.
- Measure the inside diameter of each valve guide.
- Measure according to the rocker thrust direction at three different heights.
- If the valve seat impression width or the valve,guide diameter are larger than the prescribed values, replace the head.



### Characteristic

#### **Wear of valve seats: Intake guide**

Admissible limit:  
5,022

#### **Wear of valve seats: Intake guide**

Standard diameter:  
5,000 ÷ 5,012 mm

#### **Wear of valve seats: Exhaust guide**

Admissible limit  
5,022

#### **Wear of valve seats: Exhaust guide**

Standard diameter:  
5,000 ÷ 5,012 mm

# ENGINE

## INSPECTING THE VALVES

- Check the valve stem diameter at the three points shown in the figure.

- Calculate the clearance between valve and valve guide.

- Check that the contact surface with the articulated register terminal is free from wear.

- If the checks above give no failures, you can use the same valves. To obtain better sealing performance, grind the valve. Perform this operation carefully using fine grain emery paste. While grinding, keep the head with the valve axes in horizontal position to prevent the emery paste residues from penetrating into the valve guide stem coupling (see figure).

### CAUTION

TO PREVENT SCRATCHING THE CONTACT SURFACE, DO NOT FORCE THE VALVE ROTATION WHEN THE EMERY PASTE FINISHES. CAREFULLY CLEAN THE HEAD AND THE VALVES USING A SUITABLE PRODUCT FOR THE TYPE OF EMERY PASTE USED.

N.B.

DO NOT CHANGE THE VALVE ASSEMBLY POSITION.

### Characteristic

#### Valve check: standard length

Exhaust: 94,4 mm

#### Valve check: standard length

Intake: 94,6 mm

#### Valve check: maximum admissible clearance

Exhaust: 0,072 mm

#### Valve check: maximum admissible clearance

Intake: 0,062 mm

#### Valve check: standard clearance

Exhaust:  $0,025 \div 0,052$  mm

#### Valve check: standard clearance

Intake:  $0,013 \div 0,040$  mm

#### Valve check: minimum admissible diameter

Exhaust: 4,95 mm

#### Valve check: minimum admissible diameter

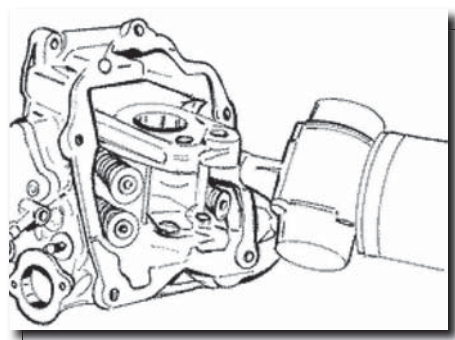
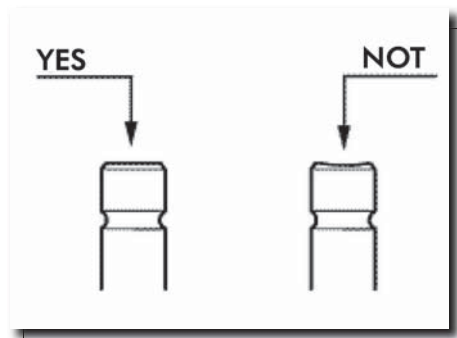
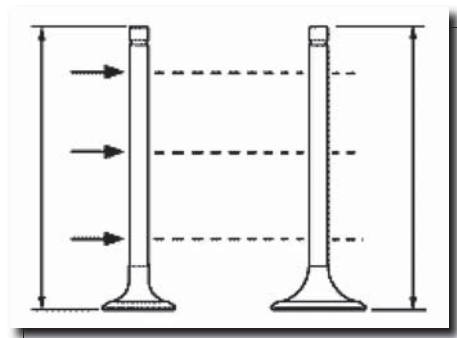
Intake: 4,96 mm

#### Valve check: standard diameter

Intake:  $4,972 \div 4,987$  mm

#### Valve check: standard diameter

Exhaust:  $4,96 \div 4,975$  mm



# ENGINE

- Measure the sealing surface width on the valves and valve seats.

## **Sealing surface width: after use:**

Intake and exhaust: 1.6 mm

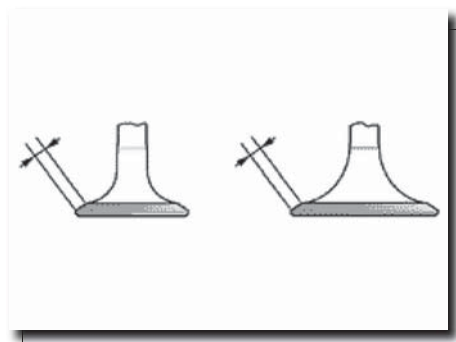
- If the valve sealing surface is wider than the prescribed limit, interrupted in one or more points, or it is bent, replace the valve.

## **CAUTION**

DO NOT CHANGE THE VALVE ASSEMBLY POSITION (RH-LH)

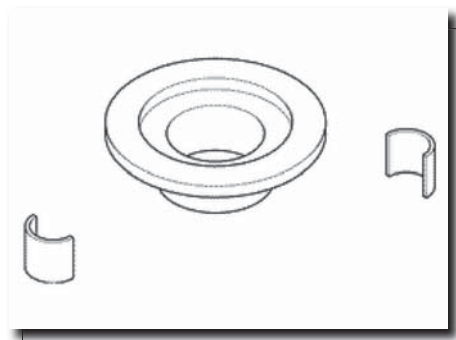
## **Characteristic**

Valve wear check: standard: intake and exhaust  
0,99 ÷ 1,27mm



## **INSPECTING THE SPRINGS AND HALF-CONES**

- Check that the spring upper support plates and half-cones are free from irregular wear.



## **REFITTING THE VALVES**

- Lubricate the valve guides with engine oil.
- Place the valve spring rests on the head.
- Using the specific punch, insert the 4 sealing rings alternately.
- Insert valves, springs and plates. Using the specific tool provided with the special adapter, compress the springs and insert the half-cones into the relevant seats.



# ENGINE

## N.B.

DO NOT CHANGE THE VALVE ASSEMBLY POSITION. FIT THE VALVES WITH THE REFERENCE COLOUR ON THE HALF-CO-NES SIDE (LARGER STEP CURLS).

## Specific tooling

020306Y Valve sealing ring drift

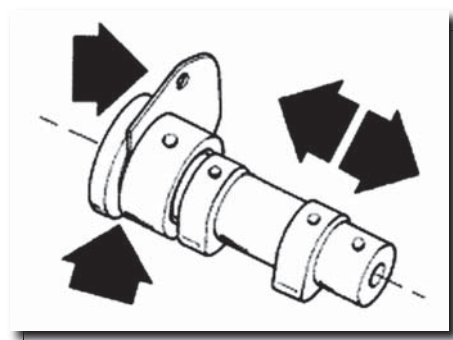
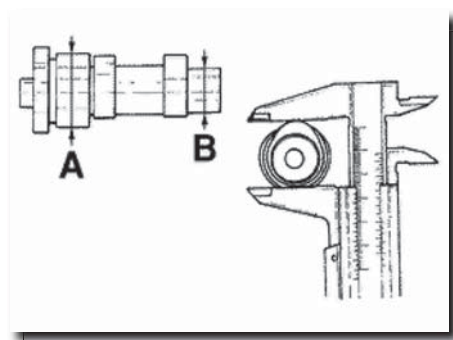
020382Y Tool for removing valve cotters equipped with part 012

020382Y011 Bushing (valve remover)



## INSPECTING THE CAM SHAFT

- Check that the camshaft ends exhibit no abnormal wear.
- Measure the cam height.
- Check that the groove and relevant retain plate are free from wear.
- If different values or wear than those prescribed are found, replace the faulty parts.
- Check that the automatic valve lifting device cam, the travel end roller and the rubber abutment on the containment bell are free from wear.
- Check that the valve lifting spring has not yielded.
- In case of wear, replace the worn parts.
- Check that the rocker pins exhibit no scratches or wear.
- Measure the inside diameter of each rocker.
- Check that the cam contact sliding block and the articulated register plate is free from wear.



## Characteristic

Camshaft check:

Standard diameter:  $\varnothing$  12,000-12,011 mm

Camshaft check:

Standard diameter:  $\varnothing$  11,977÷11,985 mm

Camshaft check:

Maximum admissible axial clearance: 0,42 mm

Camshaft check:

Standard axial clearance: 0,11 -0,41 mm



# ENGINE

Camshaft check: Standard height  
Exhaust: 29,209 mm

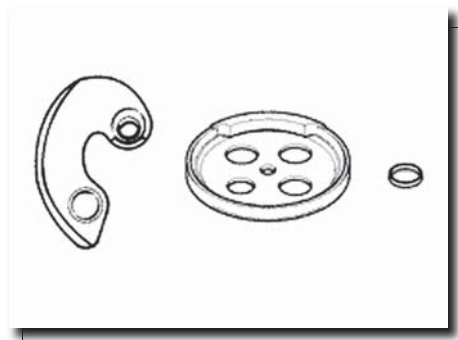
Camshaft check: Standard height  
Intake: 30,285 mm

Camshaft check: Minimum admissible diameter  
Connection B Ø: 19,950mm

Camshaft check: Minimum admissible diameter  
Connection A Ø: 36,94 mm

Camshaft check: Standard diameter  
Connection B Ø: 19,959÷19,98 mm

Camshaft check: Standard diameter  
Connection A Ø: 36,95÷36,975 mm



## RIFFITING THE TIMING SYSTEM COMPONENTS

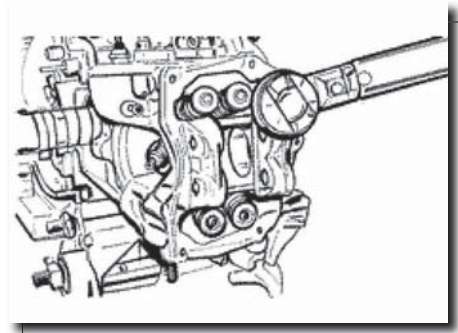
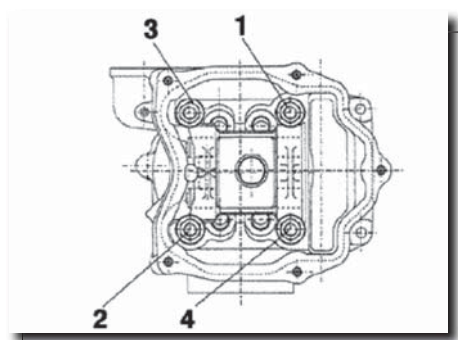
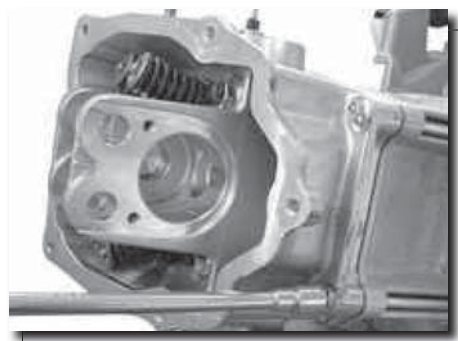
### Version 125

- Insert the timing chain guide sliding block.
- Insert the centring dowels between head and cylinder, install the head gasket and the head on the cylinder.
- Lubricate the stud bolt threading
- Tighten the nuts at a preliminary torque of  $7 \pm 1$  N·m
- Turn by an angle of  $180^\circ$  (2 turns by  $90^\circ$  each) To perform the above operations, follow the tightening sequence shown in the figure.
- Install the two screws on the timing chain side and tighten at the prescribed torque.

**N.B.**  
BEFORE INSTALLING THE HEAD, MAKE SURE THAT THE LUBRICATION CHANNEL IS CLEAN USING A COMPRESSED AIR JET.

### Locking torques (N·m)

Timing belt tightener support screw  $11 \div 13$





# ENGINE

- Fit the timing chain drive sprocket onto the crankshaft with the bevelled edge towards the inserting side.

- Fit the timing drive chain onto the crankshaft.

- Fit the tensioning roller from the cylinder head side.

- Fit the spacer with the securing bolt.

- Lock the bolt at the prescribed torque.

- Fit the shafts and the rockers.

- Lubricate the 2 rockers through the top holes.

- Lubricate the two seats and insert the camshaft into the cylinder head with the beds opposite the rockers.

- Fit the retaining plate and tighten the 2 bolts indicated in the figure, locking them at the prescribed torque.

- Insert the spacer onto the camshaft.

- Position the piston at top dead centre using the reference marks between the flywheel and the engine crankcase.

- Maintaining these positions, fit the chain onto the camshaft drive sprocket.

- Insert onto the camshaft maintaining the 4V mark in line with the reference mark made on the cylinder head.

- Fit the counterweight with the securing bolt and lock at the prescribed torque.

- Fit the end of run ring onto the valve lifter and fit the valve lifter bed onto the camshaft

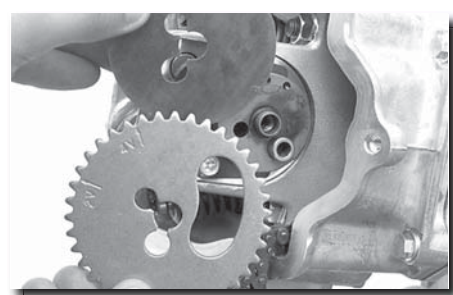
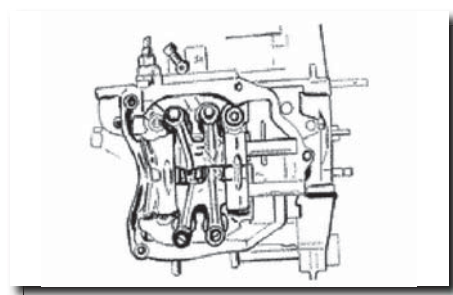
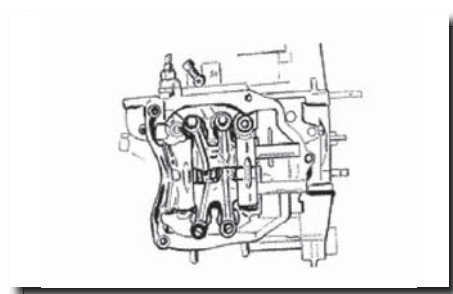
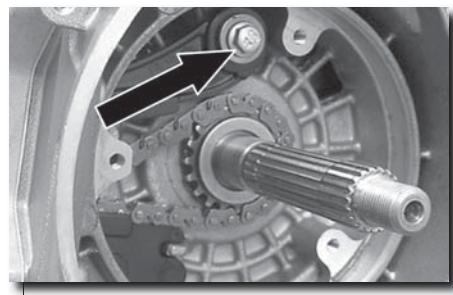
- Fit the valve lifter return spring. During this operation the spring must be loaded by some 180°.

- Fit the retaining bell housing using the counterweight securing bolt as a reference.

- Lock the central securing bolt at the prescribed torque.

- Position the tensioner cursor in the resting position.

- Fit the tensioner onto the cylinder using a new seal, locking the 2 bolts at the prescribed torque.





# ENGINE

- Insert the spring with the central screw and the washer and tighten the cap at the prescribed torque

- Adjust the valve clearance

- Install the spark plug.

**Electrode distance:** 0,8 mm

## N.B.

LUBRICATE WITH GREASE THE TRAVEL END RING TO PREVENT ACCIDENTAL LEAKS WITH CONSEQUENT DROPPING INTO THE ENGINE.

## Locking torques (N\*m)

Timing belt tightener support screw  $11 \div 13$

Spark plug  $12 \div 14$

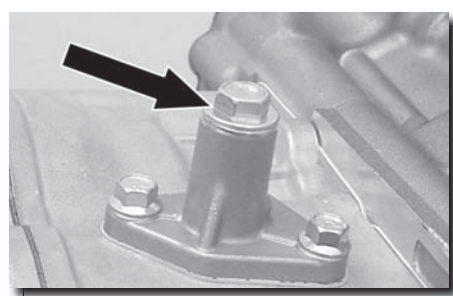
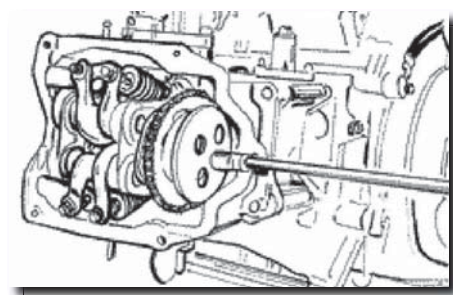
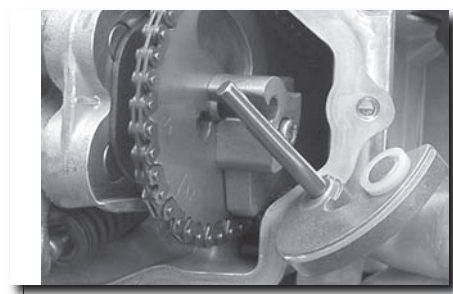
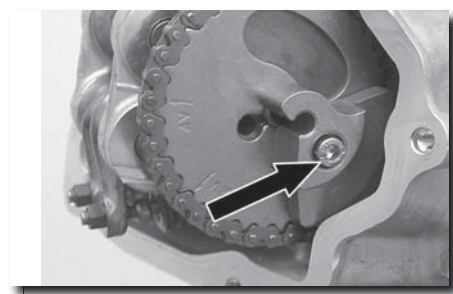
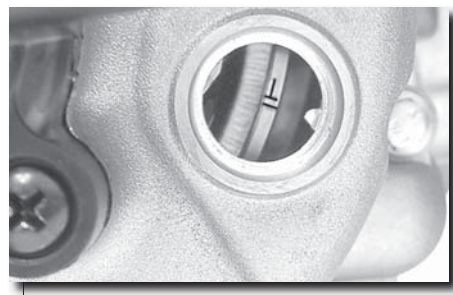
Start up mass screws  $7 \div 8,5$

Timing chain tightener sliding block screws  $10 \div 14$

Start up mass bell screws  $11 \div 15$

Timing belt tightener central screw  $5 \div 6$

Camshaft retain plate screw  $4 \div 6$



# ENGINE

## Version 250

- Insert the timing chain guide sliding block.
- Insert the centring dowels between head and cylinder, install the head gasket and the head on the cylinder. Lubricate the stud bolt threading
- Tighten the nuts to the first pre-torque of  $7 \pm 1$  N-m
- Tighten the nuts to the second pre-torque of  $10 \pm 1$  N-m
- Make a  $270^\circ$  angle rotation
- To perform the above operations, follow the tightening sequence shown in the figure.
- Install the two screws on the timing chain side and tighten at the prescribed torque.

### N.B.

BEFORE INSTALLING THE HEAD, MAKE SURE THAT THE LUBRICATION CHANNEL IS CLEAN USING A COMPRESSED AIR JET.

### Locking torques (N\*m)

Timing belt tightener support screw  $11 \div 13$

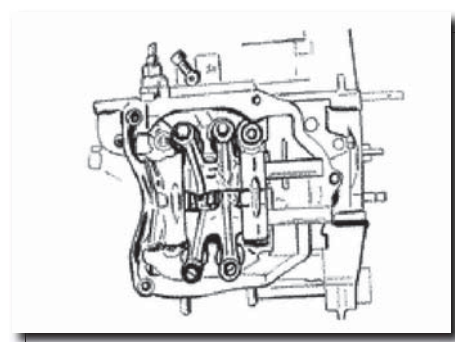
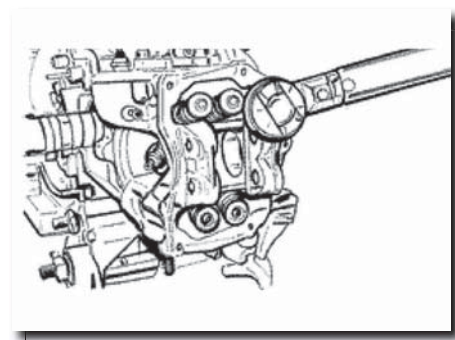
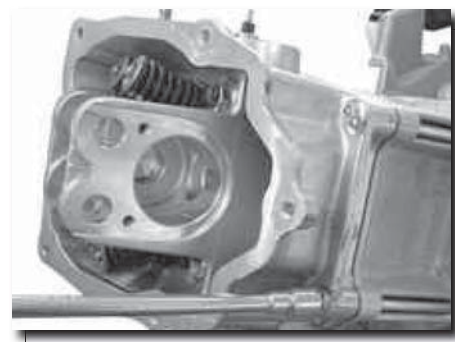
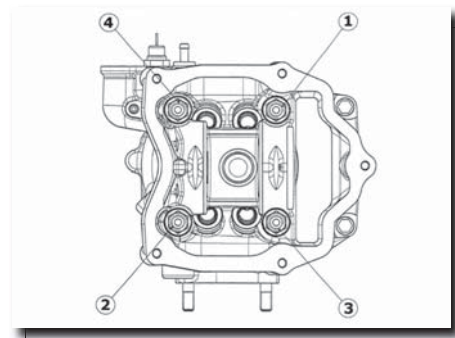
## Version 250

Install the timing chain control pinion on the driving shaft with the chamfering facing the introduction side.

- Insert the timing control chain on the driving shaft.
- Insert the tightener sliding block on the head side.
- Install the spacer with the fixing screw.
- Tighten the screw at the prescribed torque.

### Locking torques (N\*m)

Sliding block screw  $10 \div 14$  Nm



# ENGINE

- Install pins and rockers.
- Lubricate the 2 rockers through the top holes.
- Lubricate the 2 connections and insert the camshaft into the head with the cams opposite the rockers.
- Insert the retain plate and tighten the 2 screws shown in the figure at the prescribed torque.

## Locking torques (N\*m)

Plate screws  $4 \div 6$  Nm

Insert the spacer on the camshaft.

- Place the piston on the top dead centre using the references between flywheel and engine crankcase.
- Keeping this position, insert the chain on the camshaft control pulley.
- Insert the pulley on the camshaft keeping the reference 4V at the reference point obtained on the head.
- Install the balance weight with its fixing screw and tighten at the prescribed torque.

## Locking torques (N\*m)

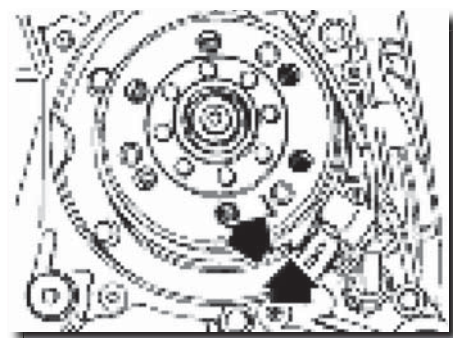
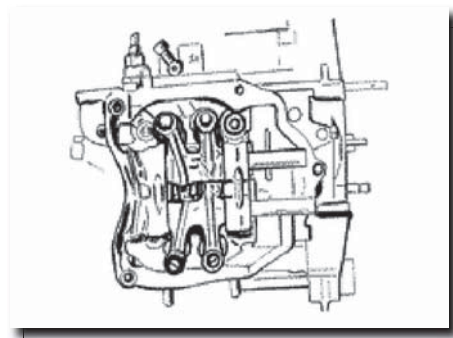
Balance weight screw  $7 \div 8,5$  Nm

Insert the travel end ring on the valve lifting mass and mount the valve lifting cam on the camshaft.

### N.B.

LUBRICATE WITH GREASE THE TRAVEL END RING TO PREVENT ACCIDENTAL LEAKS WITH CONSEQUENT DROPPING INTO THE ENGINE.

INSTALL THE VALVE LIFTER RETURN SPRING. DURING THIS OPERATION, THE SPRING MUST BE LOADED BY ABOUT 180°.



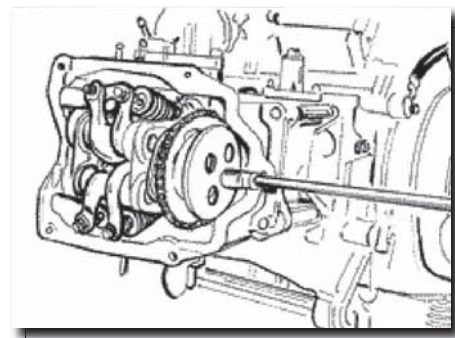
# ENGINE

Install the containment bell using the balance weight fixing screw as a reference.

- Tighten the central fixing screw at the prescribed torque.

### Locking torques (N\*m)

Containment bell screw  $11 \div 15$  Nm



Set the tightener cursor to the rest position.

- Install the tightener on the cylinder using a new gasket and tighten the 2 screws at the prescribed torque.

Insert the spring with the central screw and the washer and tighten the cap at the prescribed torque.



### Locking torques (N\*m)

Tightener screws  $11 \div 13$  Nm

Tightener cap  $5 \div 6$  Nm

- Adjust the valve clearance

- Install the spark plug.

Electrode distance: 0.8 mm

### Locking torques (N\*m)

Spark plug  $12 \div 14$  Nm

Replace the head cover and tighten the 5 screws at the prescribed torque. Check the proper position of the gasket.

Replace the flywheel cover as already described in the flywheel chapter.

- Replace the oil pump control, the chain compartment cover, the by-pass and the oil sump as described in the Lubrication chapter.

- Replace the driving pulley, the belt and the transmission cover as described in the Transmission chapter.

### Locking torques (N\*m)

Tappet cover screws  $6 \div 7$  Nm

# ENGINE

## REFITTING THE TIMING SYSTEM COMPONENTS

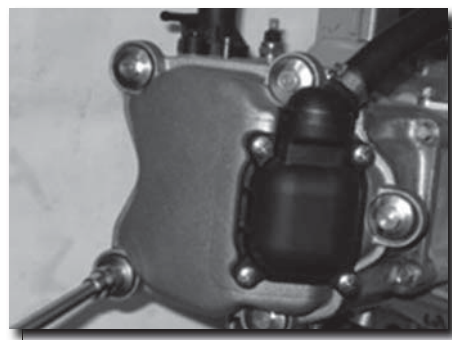
NAME	TORQUE IN Nm
Tappet cover screws	$6 \div 7$ Nm
Spark plug	$12 \div 14$ Nm
Tightener cap	$5 \div 6$ Nm
Tightener screws	$11 \div 13$ Nm
Containment bell screw	$11 \div 15$ Nm
Balance weight screw	$7 \div 8,5$ Nm
Plate screws	$4 \div 6$ Nm
Sliding block screw	$10 \div 14$ Nm

## REFITTING THE ROCKER-ARMS COVER

- Reassemble the head cover by locking the 5 screws to the prescribed torque.
- Pay attention to correct positioning of the gasket.

### Locking torques (N\*m)

Tappet cover screws  $6 \div 7$  Nm



## REFITTING THE INTAKE MANIFOLD

- Install the intake manifold and tighten the 3 screws.

**N.B.**  
FOR THE SPECIAL SCREWS OF VERSION 125CC, USE INSERTS  
AND INSERT HOLDERS AVAILABLE ON THE MARKET.





# ENGINE

## CRANKCASE - CRANKSHAFT

### SPLITTING THE CRANKCASE HALVES

#### Version 125

Remove the following assemblies: transmission cover, driving pulley, driven pulley and belt, rear hub cover, gears, bearings and oil guards as described in the Transmission chapter.

- Remove the oil sump, the by-pass, the chain compartment cover, the oil pump as described in the Lubrication chapter.

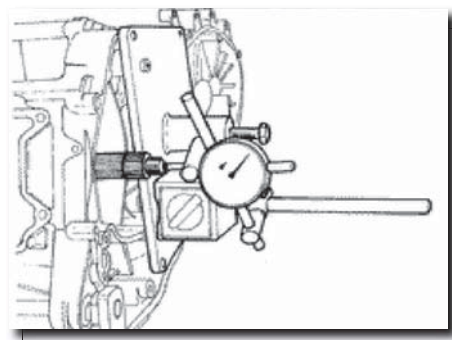
Remove the flywheel cover with water pump, the flywheel, the stator as described in the Magneto flywheel chapter.

- Remove the oil filter and the oil pressure switch.
- Remove the cylinder-piston-head unit as described in the Timing head cylinder chapter.
- Remove the 2 screws shown in the figure and the starter motor.

Before opening the engine crankcase, check the driving shaft axial clearance. To this purpose, use a plate and a support with specific comparator tool.

Higher clearance denotes wear of the crankcase driving shaft rest surfaces.

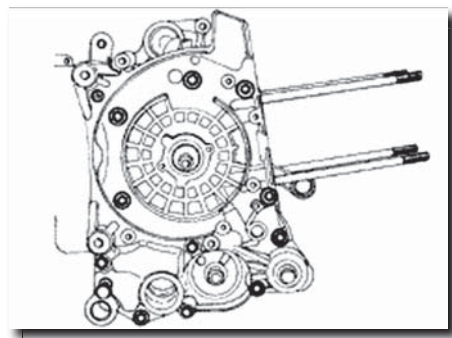
Standard clearance:  
 $0,15 \div 0,40 \text{ mm}$



- Remove the 11 screws securing the two halfcrankcases.
- Split the crankcase halves taking care to leave the crankshaft attached to one of the two halves.
- Remove the crankshaft.

#### CAUTION

FAILURE TO OBSERVE THIS RULE CAN CAUSE THE ACCIDENTAL DROP OF THE DRIVING SHAFT.

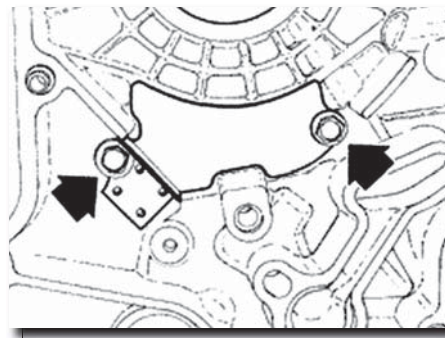


# ENGINE

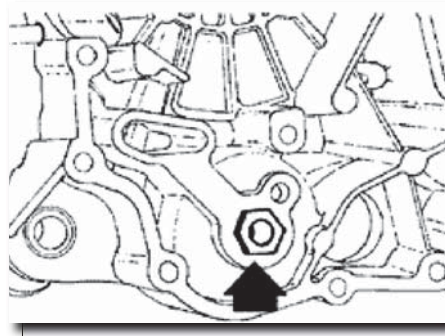
- Remove the crankcase gasket.
- Remove the two screws and the internal cover shown in the diagram.

## CAUTION

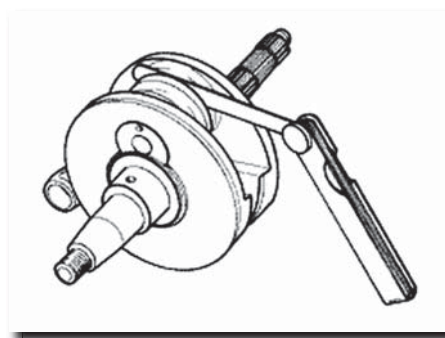
WHILE OPENING THE CRANKCASES AND REMOVING THE DRIVING SHAFT, CHECK THAT THE SHAFT THREADED ENDS DO NOT INTERFERE WITH THE BENCH BRASSES. FAILURE TO OBSERVE THIS PRECAUTION CAN DAMAGE THE BENCH BRASSES.



- Remove the oil seal on the flywheel side.
- Remove the oil filter union shown in the diagram.



Fitting clearance  
Rod axial clearance  $0,20 \div 0,50$



Inspect the radial clearance of the connecting rod.

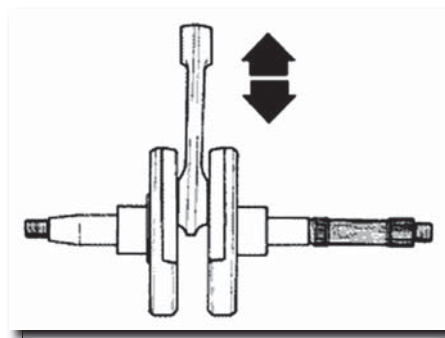
Standard clearance:  $0,036 \div 0,054$  mm

- Ensure the surfaces that limit the axial free-play are not scored and, using a calliper, measure the crankshaft width as shown in the figure.

Standard dimensions:  $55,75 \div 55,90$  mm

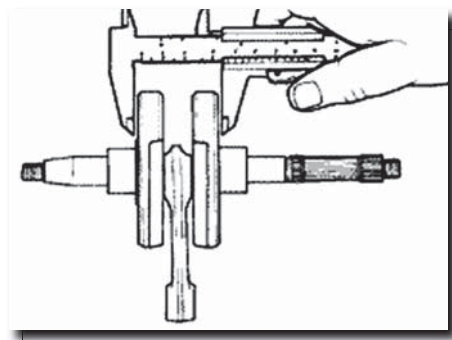
## N.B.

THE DRIVING SHAFT CAN BE REUSED WHEN THE WIDTH FALLS WITHIN THE STANDARD VALUES AND THE SURFACES ARE FREE FROM SCRATCHES.



# ENGINE

If the driving shaft - crankcase axial clearance is higher than the standard value and the driving shaft exhibits no irregularity, the problem is caused by wear or by a wrong machining on the engine crankcase

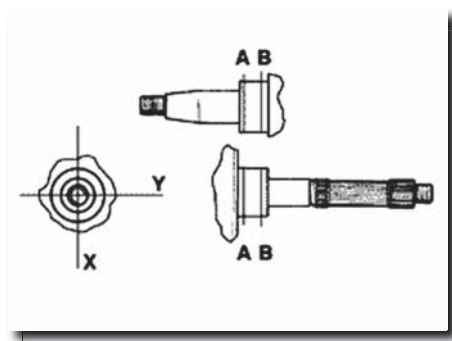


- Check the diameters of both half-shafts on the axes and planes shown in the figure. Half-shafts are categorised as categories 1 and 2; see table below.

## Characteristic

Diameter standard - Categories 2  
 $29,004 \div 29,010$

Diameter standard - Categories 1  
 $28,994 \div 29,000$



The crankshaft may be reused when its width is within the standard dimensions and the surfaces are not scored.

## Version 250

- It is advisable to check the axial clearance of the driving shaft before opening the engine cases. To do so, use a plate and support with specific comparator.

- Upper clearances are a sign of wear on the resting surfaces of the driving shaft and case.

- Remove the 10 case coupling screws.

- Divide the cases while keeping the driving shaft inserted on one of the two half cases.

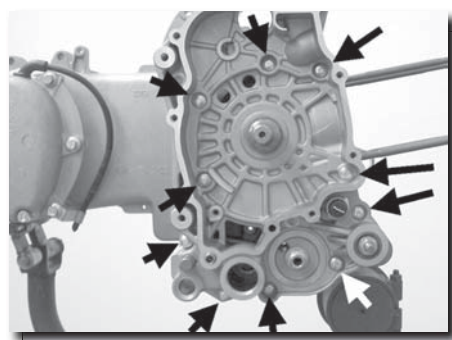
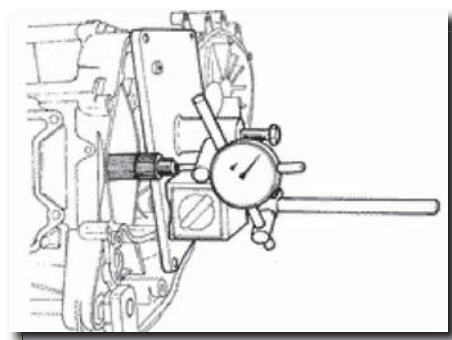
- Remove the driving shaft.

- Remove the half case coupling gasket.

- Remove the 2 screws and the internal bulkhead shown in the figure.

- Remove the oil seal on the flywheel side.

- Remove the oil filter union shown in the figure.





# ENGINE

- Check the axial clearance of the connecting rod.
- Check the radial clearance of the connecting rod.
- Check that the axial clearance containment surfaces do not show scoring and using a gauge, check the width of the driving shaft as shown in the figure.
- If the driving shaft-case axial clearance is greater than the standard and the driving shaft does not show any abnormality, the problem is surely due to wear or incorrect machining of the engine case.
- Check the diameters of both capacities of the driving shaft according to the axes and planes shown in the figure. The shaft sections are classified in two categories, Cat. 1 and Cat. 2 shown beneath in the table.

## CAUTION

BE CAREFUL NOT TO LET THE MEASUREMENT BE AFFECTED BY THE UNIONS WITH THE DRIVING SHAFT ENDS.

## CAUTION

WHILE OPENING THE CRANKCASES AND REMOVING THE DRIVING SHAFT, CHECK THAT THE SHAFT THREADED ENDS DO NOT INTERFERE WITH THE BENCH BRASSES. FAILURE TO OBSERVE THIS PRECAUTION CAN DAMAGE THE BENCH BRASSES.

## CAUTION

FAILURE TO OBSERVE THIS RULE CAN CAUSE THE ACCIDENTAL DROP OF THE DRIVING SHAFT.

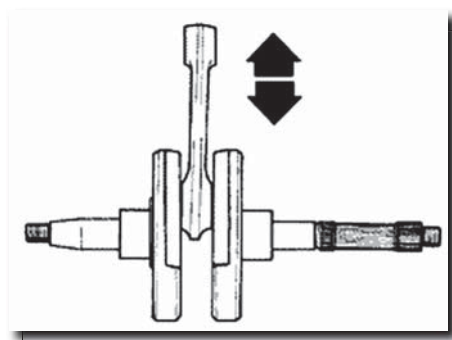
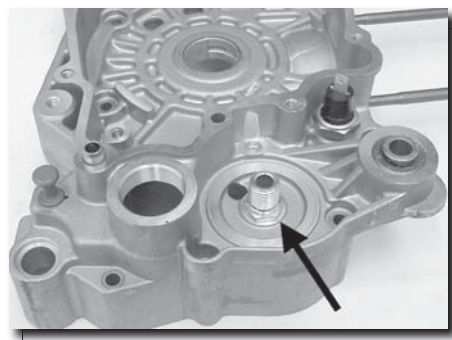
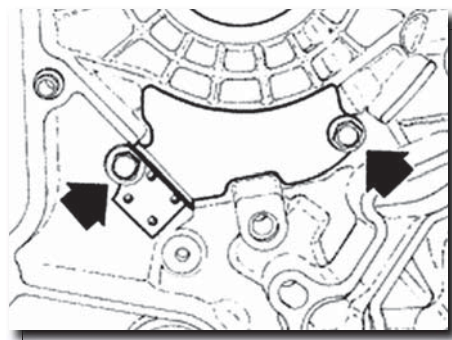
## N.B.

THE DRIVING SHAFT CAN BE REUSED WHEN THE WIDTH FALLS WITHIN THE STANDARD VALUES AND THE SURFACES ARE FREE FROM SCRATCHES.

## Specific tooling

020262Y Crankcase detachment plate

020335Y Magnetic stand and comparator



# ENGINE

## Characteristic

Driving shaft - case axial clearance:  
Standard clearance  $0,15 \div 0,40$  mm

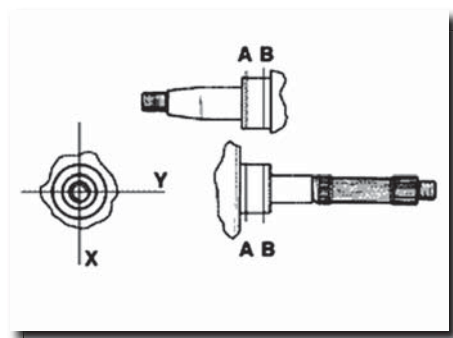
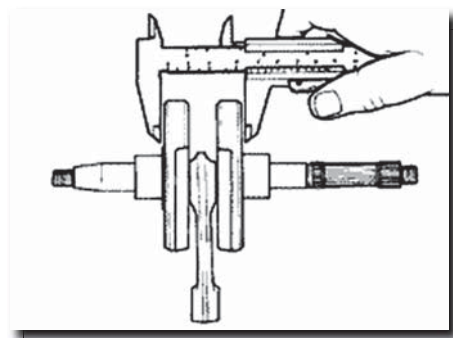
Driving shaft - connecting rod axial clearance:  
Standard clearance  $0,20 \div 0,50$  mm

Driving shaft - connecting rod radial clearance:  
Standard clearance  $0,036 \div 0,054$  mm

Driving shaft width with complete washers standard measurements  
 $55,67 \div 55,85$  mm

Driving shaft capacities:  
Standard diameter: cat1 -  $28,994 \div 29,000$

Driving shaft capacities:  
Standard diameter: cat 2 -  $29,000 \div 29,006$



## INSPECTING THE CRANKSHAFT ALIGNMENT

To install the drive shaft on the support and to measure the misalignment in the 4 points indicate to you in figure.

- Check that the driving shaft cone, the tab seat, the oil guard connection and the threaded tangs are in good working order.

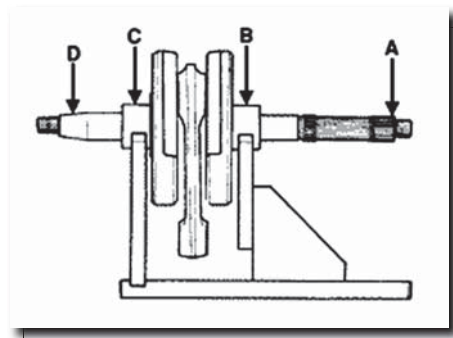
- In case of failures, replace the driving shaft. The connecting rod head brases cannot be replaced.

For the same reason, when cleaning the driving shaft, be careful to prevent any impurity from entering into the shaft lubrication hole.

In order to prevent damaging the connecting rod brases, do not attempt cleaning the lubrication duct with compressed air.

- Make sure that the 2 pads on the crank button are properly mounted.

- A wrong installation of a pad can seriously affect the brass lubrication pressure.



# ENGINE

**N.B.**  
ENCH ENDS ARE NOT RECTIFIABLE.

## Specific tooling

020074Y Crankshaft aligning tool

## Characteristic

Alignment check: Max admissible displacement:

- A = 0,15mm
- B = 0,01 mm
- C = 0,01 mm
- D = 0,10 mm

## INSPECTING THE CRANKCASE HALVES

- Before checking the crankcase, carefully clean all lubrication channels and surfaces.

- For the transmission side half-crankcase, especially clean the compartment and the channels of the oil pump, the by-pass duct, the bench brasses and the cooling jet on the transmission side, see figure.

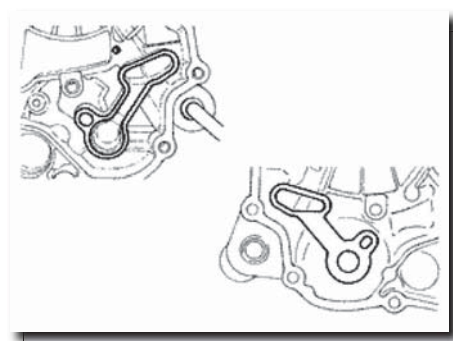
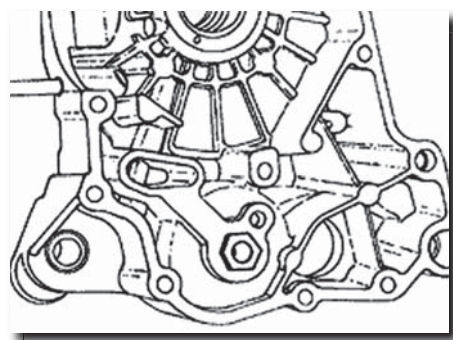
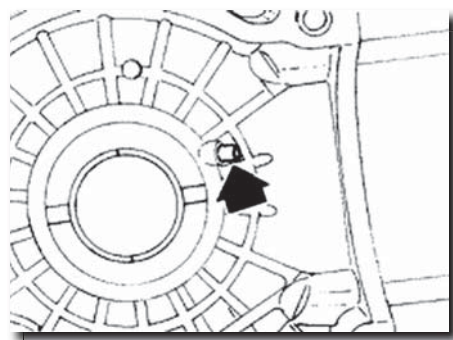
As already described in the Lubrication chapter, it is especially important that the by-pass housing is free from wear that may impair the proper sealing of the lubrication pressure adjustment piston.

- For the half-crankcase on the transmission side, especially clean the lubrication channels of the bench brasses, the head oil feeding jet channel, the drainage channel for the oil guard on the flywheel side.

- Check that the surfaces are free from dents or deformations, with special attention to the crankcase coupling and the crankcase-cylinder surfaces.

- Any defects in the crankcase gasket or on the surfaces indicated in the figure can cause pressurised oil leaks, thereby affecting the connecting rod and bench brass lubrication pressure.

- Check that the driving shaft axial clearance containment surfaces are free from wear. For the dimensional check, refer to the instructions relating to the axial clearance and dimensions check on the driving shaft.



# ENGINE

## N.B.

THE HEAD LUBRICATION CHANNEL IS PROVIDED WITH A SHUTTER JET; THIS GIVES A «LOW PRESSURE» HEAD LUBRICATION; THIS CHOICE WAS MADE TO REDUCE THE OIL TEMPERATURE IN THE SUMP. THE JET CLOGGING IMPAIRS THE HEAD LUBRICATION AND THE TIMING MECHANISMS. A JET FAILURE CAUSES A DECREASE OF THE BENCH BRASS AND CONNECTING ROD LUBRICATION PRESSURE.

## N.B.

THE JET IS FED THROUGH THE BENCH BRASSES. PROPER OPERATION OF THIS COMPONENT IMPROVES THE PISTON TOP COOLING. CLOGGING HAS EFFECTS THAT ARE DIFFICULT TO DETECT (PISTON TEMPERATURE INCREASE). FAILURE OR LEAK CAN CONSIDERABLY DECREASE THE BENCH BRASS AND CONNECTING ROD LUBRICATION PRESSURE.

## INSPECTING THE CRANKSHAFT PLAIN BEARINGS

- To obtain a proper lubrication of the brasses, it is necessary to have an optimum lubrication pressure (3,2 bar) and a good oil rate; to this purpose, the brasses must be placed properly, so as to not have shuttering in the oil feeding channels.

- Bench brasses are realised with 2 half-bearings, one of which is solid while the other has holes and seats for lubrication.

- The solid half-bearing is intended to stand the thrusts caused by combustion, and for this reason it is arranged opposed the cylinder.

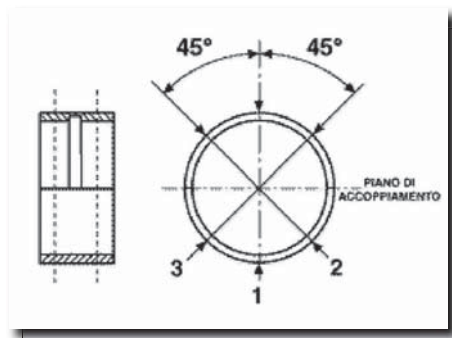
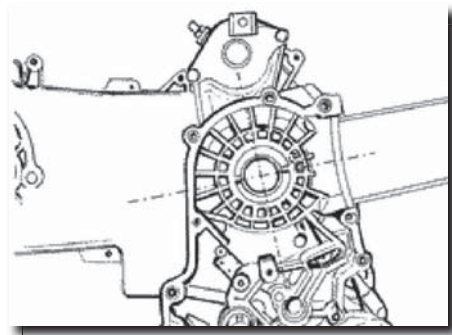
- To prevent shutters in the oil feeding channels, the matching surface of the two half-bearings must be perfectly orthogonal to the cylinder axis, as shown in the figure.

- The oil feeding channel section is also affected by the brass driving depth relative to the driving shaft axial clearance containment plane.

- Check the brass diameter in the 3 directions shown in the figure.

- Repeat the measurements for the other half of the brass. See figure.

- The crankcase is supplied in three setup versions: with RED brasses, with BLUE brasses and with YELLOW brasses.



# ENGINE

- The brass housing hole is in the only category reported below.
- The standard brass diameter after driving is variable on the basis of a coupling selection.
- The brass seats into the crankcases are classified into 2 categories as for the driving shaft Cat. 1 and Cat. 2.
- Brasses are divided into 3 categories according to their thickness. See the table below:

TYPE	IDENTIFICATION
A	RED
B	BLUE
C	YELLOW

	Type "A"	Type "A"	Type "A"
Bench halfbearing	1,970 ÷	1,9703 ÷	1,976 ÷
	1,973	1,976	1,979

Brass category	Half crankcase category	Brass inside diameter after reassembly	Possibility of assembly
A	1	29,025 ÷ 29,040	Original
B	1	29,019 ÷ 29,034	Original and spare
	2	29,028 ÷ 29,043	
C	2	29,022 ÷ 29,037	Original

Match the shaft with two category 1 shoulders with category 1 crankcase (or cat. 2 with cat. 2).

A spare crankcase cannot be combined with a driving shaft with mixed categories. Spare shafts have half-shafts of the same category.

HALF-CRANKCASE	ENGINE HALFSHAFT	BRASS
CAT. 1	CAT. 1	B
CAT. 2	CAT. 2	B
CAT. 1	CAT. 2	A
CAT. 2	CAT. 1	C

# ENGINE

**N.B.**

TO KEEP SUCH POSITION OF THE BRASSES ON THE CRANKCASE, DRIVING IS FORCED ON STEEL RINGS INSERTED IN THE CASTING OF BOTH HALF-CRANKCASES.

**N.B.**

DO NOT TAKE THE MEASURE ON THE HALFBEARING MATCHING SURFACE SINCE THE ENDS ARE RELEASED TO ALLOW DEFORMATION UPON INSERTION.

**N.B.**

SPARE CRANKCASES ARE SELECTED WITH HALF-CRANKCASES OF THE SAME CATEGORY AND MOUNTED WITH CATEGORY B BRASSES (BLUE COLOURED).

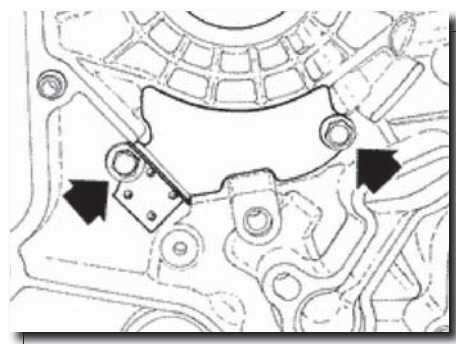
**Characteristic**

Standard driving depth  
 $1,35 \div 1,6$

Crankcase diameter without brass  
 $32,953 \div 32,963$

## REFITTING THE CRANKCASE HALVES

- Assemble the internal bulkhead by locking the 2 screws to the prescribed torque.
- Mount the oil filter union, tightening it to the prescribed torque.
- Position the gasket on the half case together with the centring dowels, preferably on the transmission side of the half case.
- Lubricate the bench bronzes and insert the driving shaft on the transmission side of the halfcase.
- Join the 2 half cases.
- Mount the 10 screws and lock to the prescribed torque.
- Mount a new O-ring on the precleaner and lubricate it.



# ENGINE

- Insert the precleaner on the engine with relative plug. Lock to the prescribed torque.

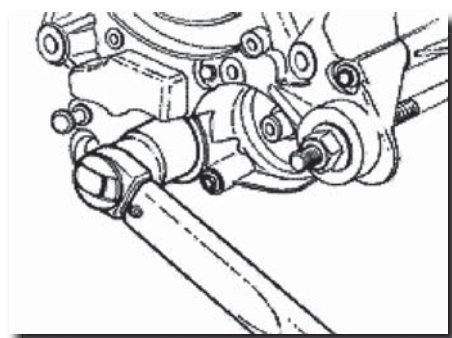
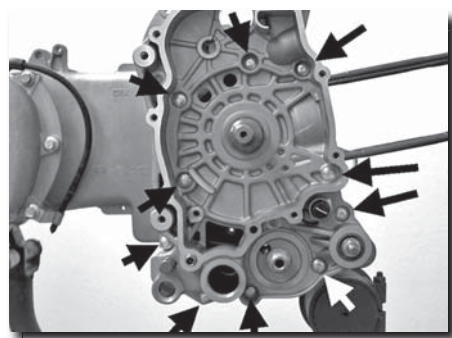
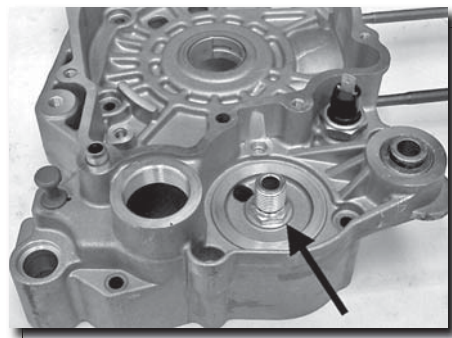
## Locking torques (N\*m)

Engine crankcase inside head screws (transmission side half shaft)  $4 \div 6$

Engine crankcase coupling screws  $11 \div 13$

Filter union on crankcase  $27 \div 33$

Engine oil / net filter drainage cap  $24 \div 30$



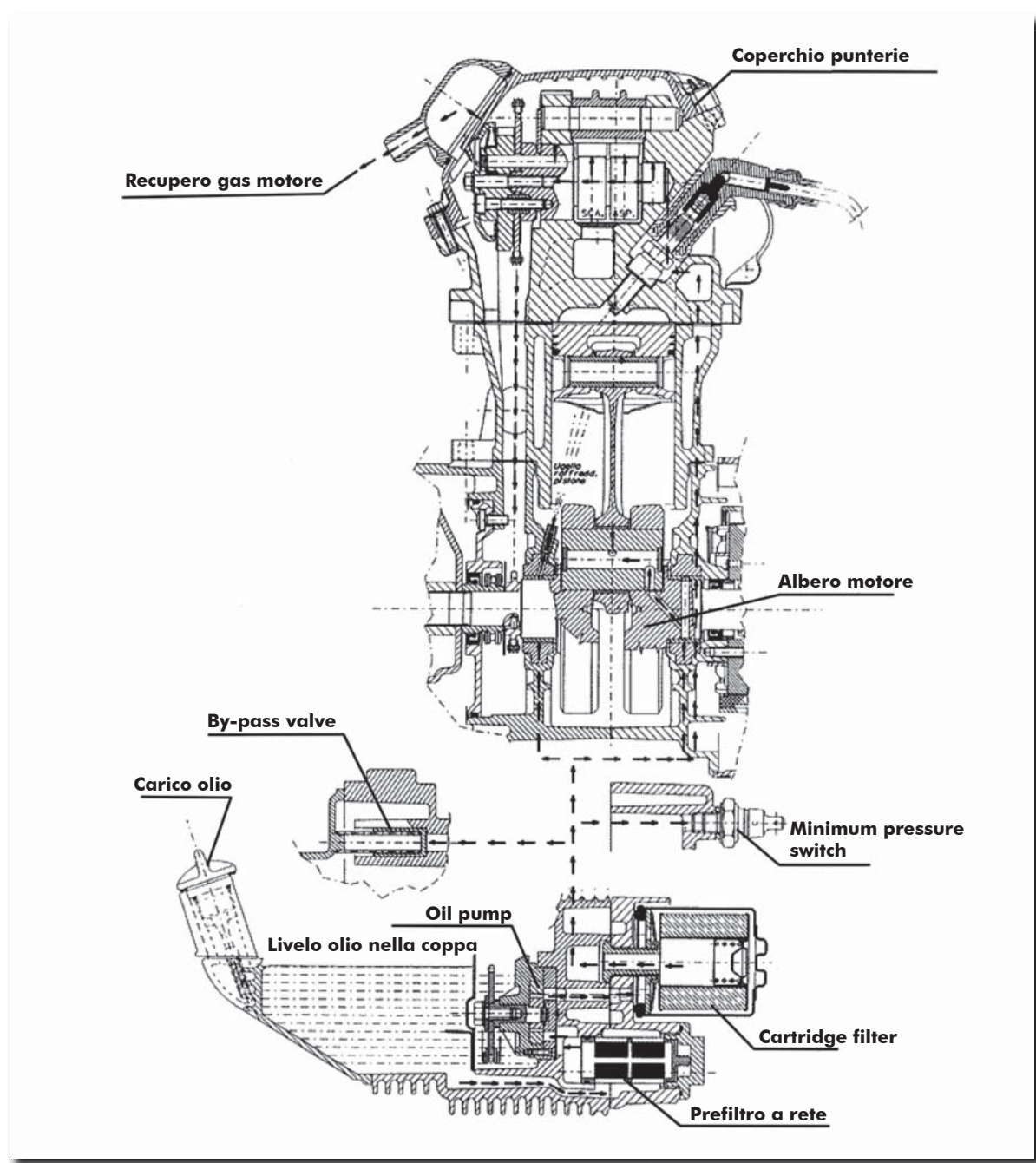


# ENGINE

## LUBRICATION

### CONCEPTUAL DIAGRAMS

#### Lubrication circuit



# ENGINE

## OIL PRESSURE CHECK

- After removing the flywheel cover as explained in the Flywheel chapter, disconnect the minimum oil pressure switch electric connection and remove the switch.

- With engine at 1,650 rpm, and with oil at a temperature of ~90°C, check that oil pressure ranges between 0.5 - 1.2 atm.

- With engine at 6000 rpm, and with oil at a temperature of ~90°C, check that oil pressure ranges between 3.2 - 4.2 atm.

- After the check, remove the specific tools mounted on the engine, replace the oil pressure switch and the washer and lock at the prescribed tightening torque, then install the flywheel cover.

- In case of non-conforming pressure, check the oil filter, the by-pass, the oil pump and the seals on the driving shaft in a sequence.

### N.B.

THE CHECK MUST BE CARRIED OUT WITH OIL AT THE CORRECT LEVEL AND WITH AN OIL FILTER IN GOOD CONDITIONS.

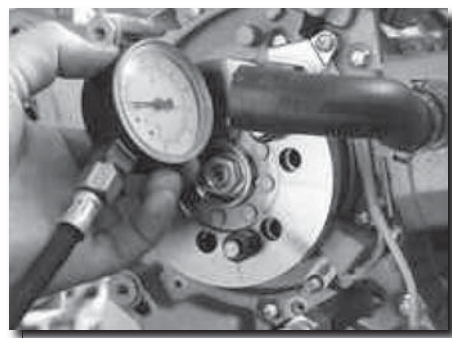
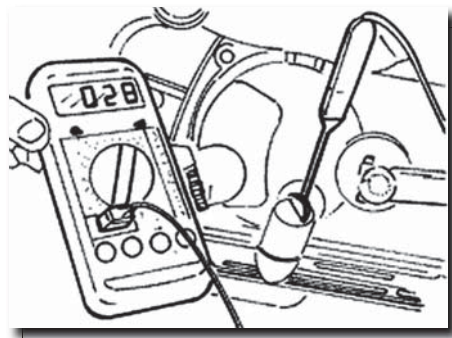
### Characteristics

Oil pressure

Minimum admissible pressure at 6.000 rpm: 3.2 atm.

### Locking torques (N\*m)

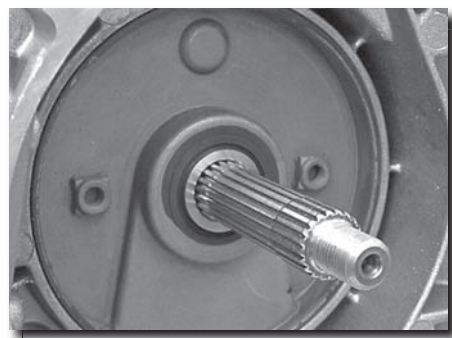
Minimum oil pressure sensor 12÷14



## CRANKSHAFT OIL SEALS

### REMOVAL

- Remove the transmission cover and complete driving pulley beforehand.

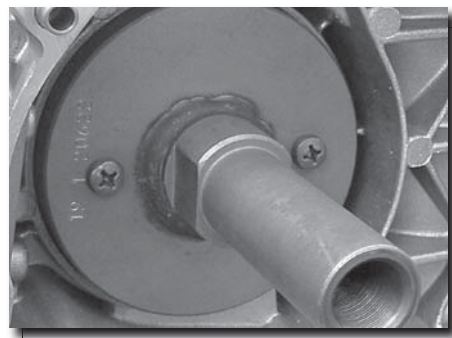


# ENGINE

- Install the base of the specific tool on the oil seal using the screws provided.

## **Specific tooling**

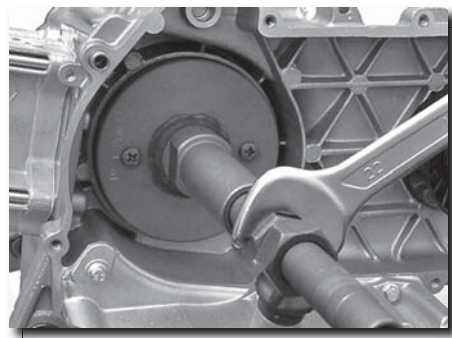
020622Y Transmission-side oil guard punch.



- Screw the threaded bar onto the base of the tool and extract the oil seal.

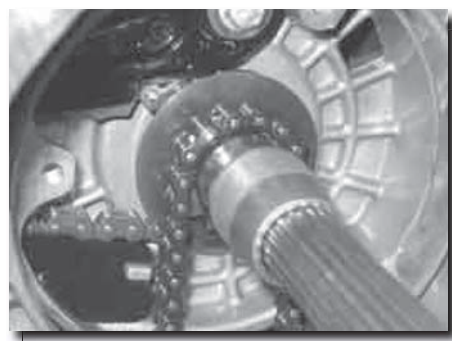
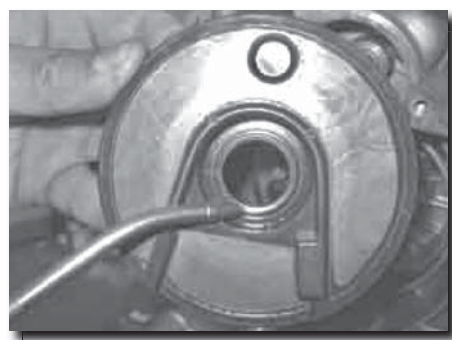
## **Specific tooling**

020622Y Transmission-side oil guard punch.



## **REFITTING**

- Check that the chain tightening sliding block is not worn.
- If so, replace it or install it in the reverse direction, making it work on the opposed side.
- Remove the oil guard using the specific tools.
- Prepare the new oil guard lubricating the sealing lip
- Pre-assemble the oil guard with the specific tool by slightly tightening the screws.
- Insert the sheath on the driving shaft.- Insert the tool with the oil guard on the driving shaft up to touch the crankcase
- Finally position the oil guard installing the bracket of the specific tool.
- Screw the threaded bar on the driving shaft to travel end
- Using the nut, operate on the base of the specific tool to perceive the oil guard mounting travel end.
- Remove all of the tool components according to the reverse order



# ENGINE

- Place the cover on the engine crankcase, apply the three screws with copper washers and install the cover into its seat by the three screws.

- Tighten the 3 screws at the prescribed torque.

## CAUTION

DO NOT LUBRICATE THE SURFACE KEYED ON THE ENGINE CRANKCASE.

## CAUTION

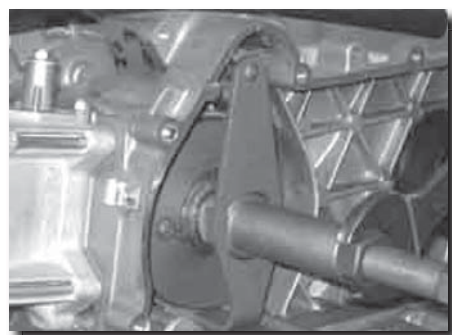
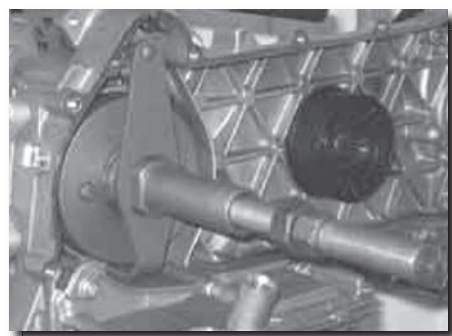
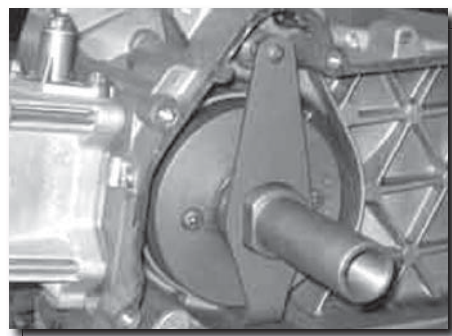
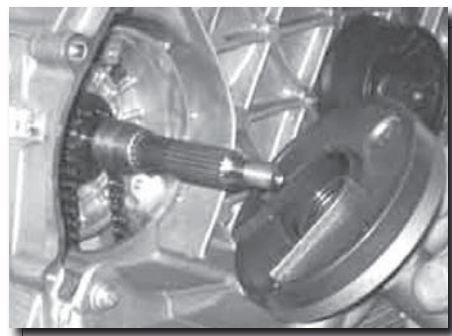
ORIENTATE THE OIL GUARD BY POSITIONING THE CHAIN HOUSING CHANNEL FACING DOWNWARDS. WHEN THE POSITION IS REACHED, DO NOT RETRACT THE OIL GUARD. FAILURE TO COMPLY WITH THIS RULE CAN CAUSE A WRONG POSITIONING OF THE OIL GUARD SHEATH.

## CAUTION

FAILURE TO COMPLY WITH THIS ASSEMBLY PROCEDURE CAN SERIOUSLY DAMAGE THE ENGINE DUE TO THE WRONG TENSIONING OF THE OIL PUMP CONTROL CHAIN.

## Specific tooling

020622Y Transmission-side oil guard punch





# ENGINE

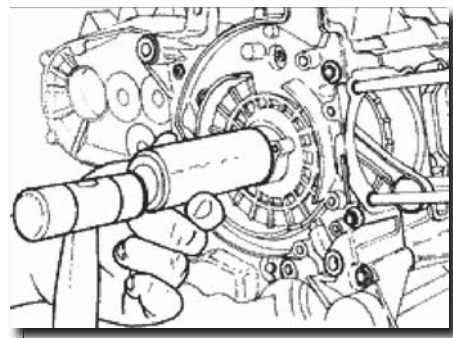
For version 125 to proceed with the assembly of new paraoil a side they fly by means of the indicated specific tool like in photo

## N.B.

FAILURE TO USE THE SPECIFIC TOOL MAY RESULT IN THE OIL SEAL BEING DRIVEN TO AN UNSUITABLE DEPTH, WHICH WOULD CAUSE THE OIL SEAL TO MALFUNCTION.

## Specific tooling

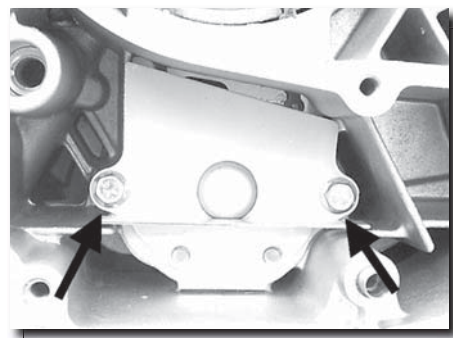
020425Y Flywheel-side oil guard punch



## OIL PUMP

### REMOVAL

- Remove the chain compartment cover by the 2 fixing screws shown in the figure and the relevant copper washer.



- Lock the oil pump control pulley rotation by a screwdriver inserted into one of its holes.

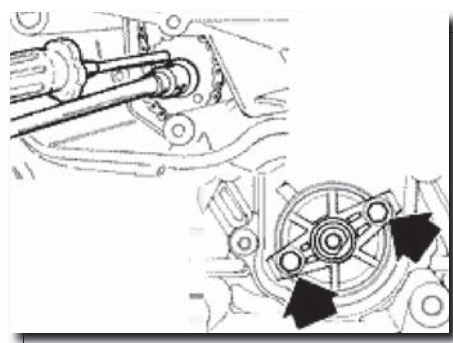
- Remove the central screw with spring washer shown in the figure.

- Remove the chain with the pulley.

- Remove the control pinion with the relevant O-Ring.

- Remove the oil pump by releasing the 2 screws shown in the figure.

- Remove the sealing gasket.



## N.B.

IT IS ADVISABLE TO MARK THE CHAIN IN ORDER TO ENSURE THAT THE INITIAL DIRECTION OF ROTATION IS MAINTAINED.

# ENGINE

## INSPECTION

- Remove the two screws and the oil pump cover.
- Remove the inside rotor retaining snap ring.
- Remove the rotors and carefully wash them with gasoline and compressed air.
- Reassemble the rotors with the pump body keeping the 2 references visible. Install the lock ring.
- Using a thickness gauge, check the distance between the rotors in the position shown in the figure.
- Check the distance between outside rotor and pump body; see figure.
- Check the rotor axial clearance using a rectified bar, as shown in the figure.

### Characteristic

#### Oil pump check 2

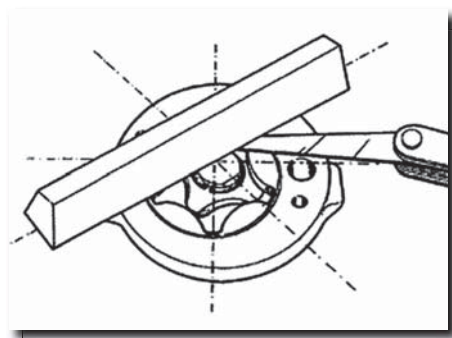
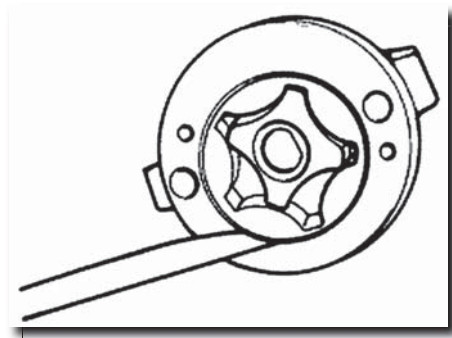
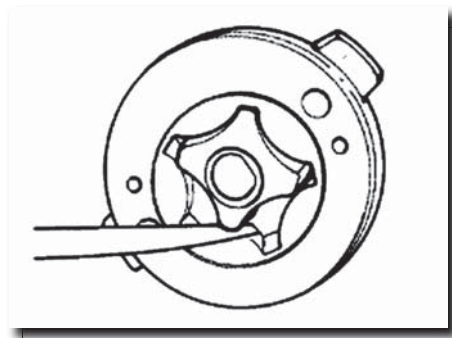
Admissible limit clearance: 0,09 mm

#### Oil pump check 1

Admissible limit clearance: 0,20 mm

#### Oil pump check

Admissible limit clearance: 0,12 mm



# ENGINE

## REFITTING

- Check that the pump body-shaft is free from wear.
- Check that the pump cover exhibits no wear or scratching.
- In case of non-conforming values or presence of scratches, replace the faulty parts or the assembly.
- Install the pump cover so as to allow the alignment of the holes for the crankcase fixing screws.
- Make sure that the gasket is in proper position and replace the pump on the engine crankcase. The pump has a single installation position. Tighten the screws at the prescribed torque.
- Install the pinion with a new O-Ring.
- Install the chain.
- Install the pulley, the central screw and the spring washer. Tighten at the prescribed torque.
- Install the pump cover and lock the two screws at the prescribed torque.

### N.B.

INSTALL THE SPRING WASHER WITH THE EXTERNAL PERIMETER IN CONTACT WITH THE PULLEY. CHECK THAT THE PUMP ROTATES FREELY.

### Locking torques (N\*m)

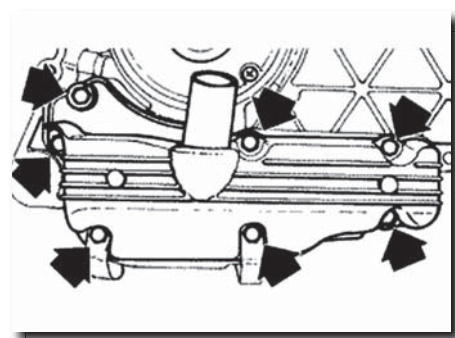
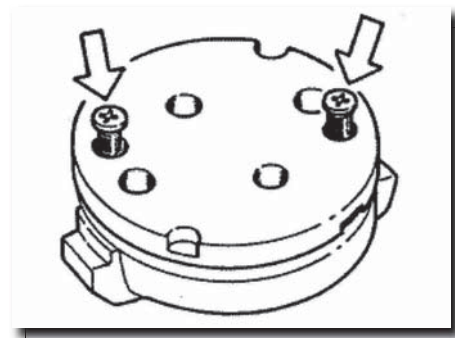
Screws fixing the oil pump to the crankcase  $5 \div 6$

Oil pump control rim screw  $10 \div 14$

Pump cover screws  $0,7 \div 0,9$

## REMOVING THE OIL SUMP

- Remove the oil loading cap, the transmission cover, the driving pulley unit with belt and the pinion as described in the Transmission chapter.
- Drain the oil from the sump as described before.
- Remove the 7 screws shown in the figure with the 2 brackets fixing the rear brake fluid piping.





# ENGINE

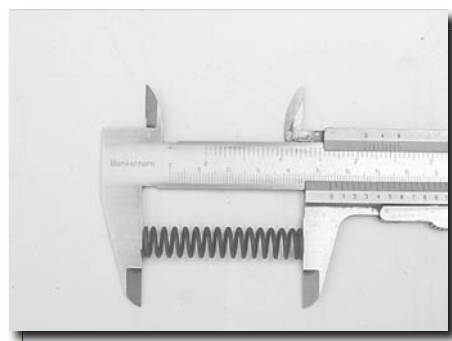
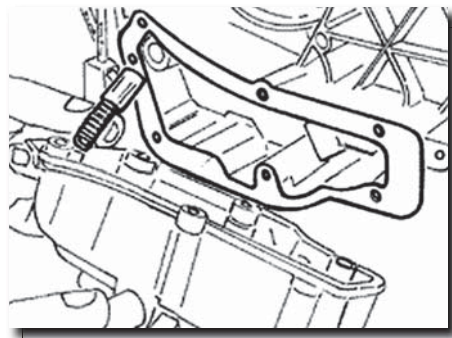
- Remove the spring, the by-pass piston, the gasket and the centring dowels shown in the second figure.

## INSPECTING THE BY-PASS VALVE

- Check the free length of the spring.
- Check that the piston exhibits no scratches.
- Ensure that it slides freely on the crankcase and that it guarantees a good seal.
- If not, eliminate any impurities or replace defective parts.

### Characteristic

Check by-pass: Standard length  
54.2 mm

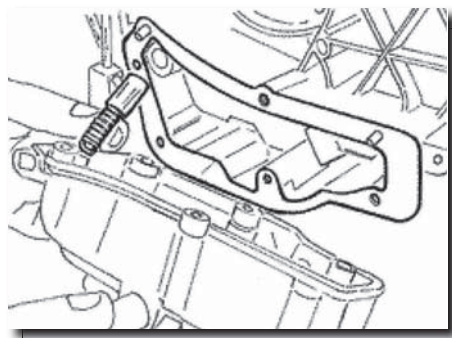


## REFITTING THE OIL SUMP

- Replace the By-pass piston into its seat.
- Insert the adjustment spring.
- Install a new sump gasket.
- Replace the two centring dowels.
- Install the sump inserting the spring into the seat on the sump.
- Replace the screws and the rear brake support pipe brackets according to the removal reverse operations.
- Tighten the screws at the prescribed torque.
- Replace the driving pulley unit, the belt, the pinion and the transmission cover as described in chapter «Transmissions».
- As regards the checks relating to connecting rod lubrication troubles, see chapter «Crankcase and driving shaft».

### Locking torques (N\*m)

Oil pan screws 10 ÷ 14



## SAS VALVE

---

### INSPECTING THE ONE-WAY VALVE

- Remove the SAS valve
- Temporarily install the rubber sleeve at the outlet of the SAS valve ensuring its seal
- Connect the vacuum pump to the rubber sleeve as shown in the figure
- Set the pump in vacuum position (VACUUM)
- Slowly open the pump
- Check that the unidirectional valve allows the passage of the air generating a small vibration.
- Switch the pump to pressure position (PRESSURE)
- Slowly open the pump and check that there is an increase of pressure. Little leaks are normal. In case of faults, replace



#### **N.B.**

AN INCORRECT OPERATION OF THE UNIDIRECTIONAL VALVE CAN CAUSE THE OVERHEATING OF THE RUBBER SLEEVE AND FILTERS.

#### **N.B.**

THE ABSENCE OF VIBRATIONS INDICATES A POOR SEALING.

#### **Specific tooling**

020329Y Pump

# ENGINE

## INSPECTING THE CUT-OFF

- Remove the SAS valve
- Connect the pump in vacuum position (VACUUM) to the CUT - OFF valve vacuum inlet
- Apply a vacuum of over 0.5 BAR
- Check that this value is maintained over time
- If the value is not maintained, proceed to replace
- Using a «T» branch and rubber hoses, implement a parallel connection between the rubber sleeve and the vacuum inlet of the CUT - OFF valve
- Connect the branch to the ^SIQgWfSK, pump
- Set the pump in vacuum position (VACUUM)
- Using pliers with flat and long tips, temporarily clamp the rubber hose in the proximity of the valve
- Command the pump to create a vacuum of over 0.5 BAR
- Release the hose and check the vacuum behaviour
- In normal operating conditions, the vacuum undergoes a drop and then settles. Then there occurs a gradual and slow depression up to the value of about 0.4 BAR. At this point, the valve opens and vacuum suddenly resets. A seal failure or opening at different vacuum values are abnormal. Proceed to the replacement.

**N.B.**  
BESIDES IMPAIRING THE FUNCTIONALITY OF THE CUT - OFF, AN INCORRECT SEAL OF THE CUT-OFF VALVE MEMBRANE AFFECTS THE IDLE OPERATION.

**N.B.**  
A SEAL FAILURE OF THE CUT - OFF VALVE CAUSES EXHAUST NOISE (EXPLOSIONS IN THE SILENCER). A WRONG CALIBRATION OF THE CUT - OFF VALVE CAN IMPAIR THE CORRECT FUNCTIONALITY OF THE CATALYTIC CONVERTER.

**Specific tooling**  
020329Y Pump



# ENGINE

## FUEL SUPPLY

---

### REMOVING THE CARBURETTOR

#### KEHIN

- To disconnect the carburettor from the engine, it is necessary to move the air filter and remove the gas control transmission, the automatic starter connection, the clamps fixing the carburettor to the filter box and to the intake manifold, the pipe feeding air to the membrane, and the intake union.

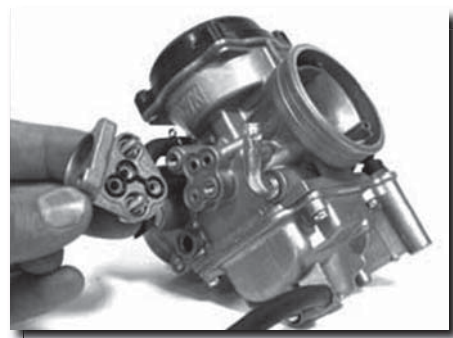
- Extract the carburettor and turn it to remove the screw with the water union and relevant pipes.

#### N.B.

THIS OPERATION IS REQUIRED TO PREVENT EMPTYING THE COOLING SYSTEM.

Remove the guard, the bracket and the starter by releasing the screw shown in the figure.

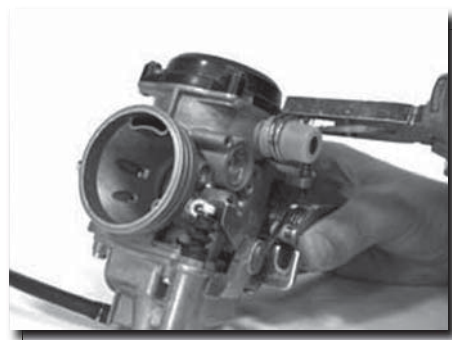
Remove the 2 screws and the starter support with the gasket.





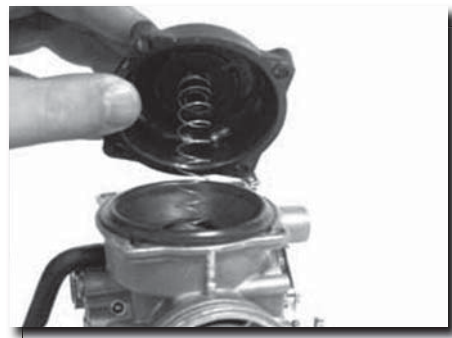
# ENGINE

- Remove the clamp and the cap with the membrane chamber aeration filter.



- Remove the 4 fixing screws shown in the figure and the vacuum chamber cover.

**WARNING**  
DURING THE COVER REMOVAL, BE CAREFUL TO THE SUDDEN PROJECTION OF THE SPRING.

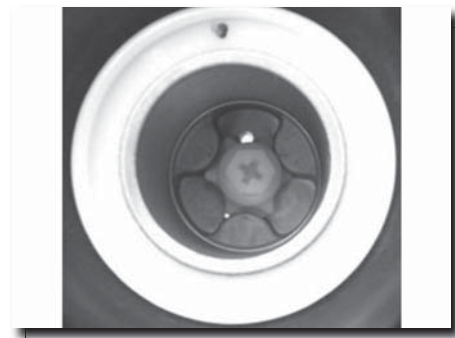


Remove the vacuum valve with the membrane.

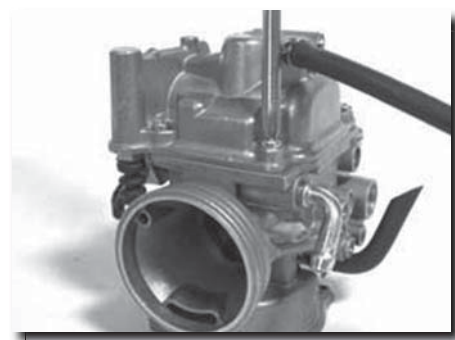


# ENGINE

Loosen the coupling by 1/8 turn and remove it, remove the spring and the vacuum valve pin.



Remove the 4 screws shown in the figure.



Remove the basin with the pickup pump, control and gasket.



- Remove the sealing gasket.

- Remove the pickup pump intake and delivery valves from the basin.

**N.B.**  
BE VERY CAREFUL SINCE VALVES CONSIST OF NOZZLE, SPRING AND BALL

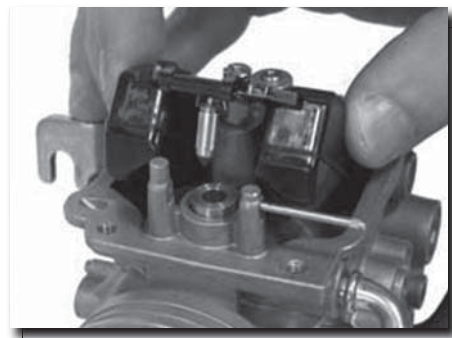
**N.B.**  
DO NOT REMOVE THE PICKUP PUMP PISTON AND RELEVANT CONTROL.



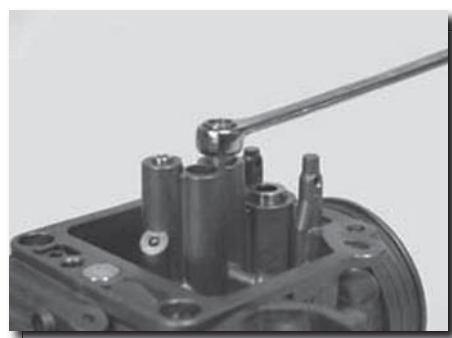


# ENGINE

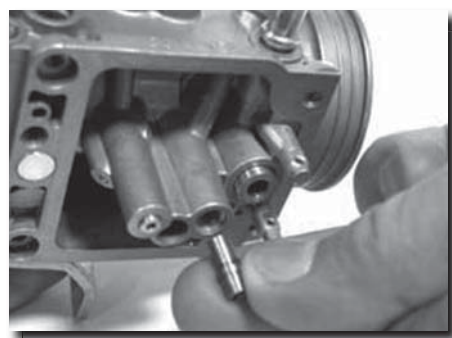
- Suitably support the carburettor and remove the float pin by a hammer from the gas control side.
- Remove the float and the pin.
- Remove the maximum nozzle.



Remove the maximum nozzle.



Remove the emulsifier.



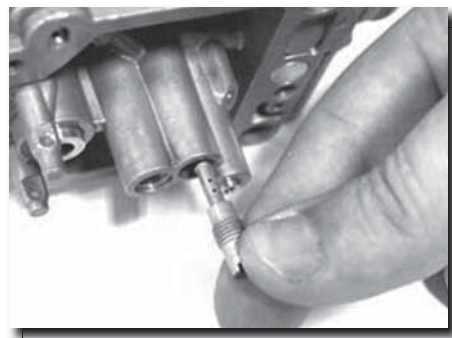


# ENGINE

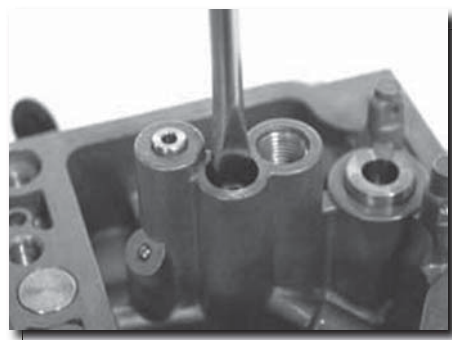
Remove the spray nozzle.

## **N.B.**

THIS OPERATION IS REQUIRED TO PREVENT LOSING THE SPRAY NOZZLE DURING THE CARBURETTOR CLEANING OPERATIONS. IF THE SPRAY NOZZLE IS FORCED INTO ITS SEAT, DO NOT REMOVE IT TO PREVENT DAMAGING IT.



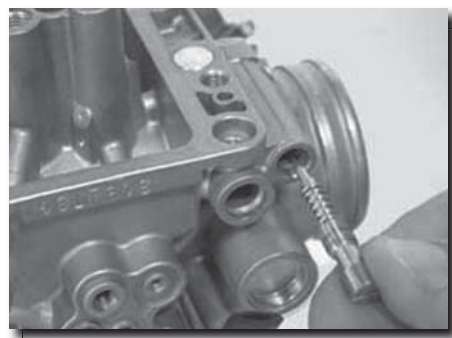
Remove the minimum nozzle.



Remove the minimum flow adjustment screw and the spring.

## **CAUTION**

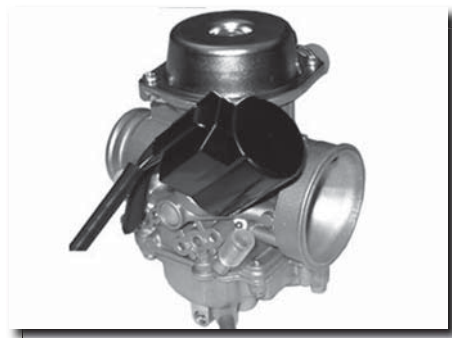
DO NOT REMOVE THE COMPONENTS FIXED INTO THE CARBURETTOR BODY, SUCH AS: FUEL FEEDING DUCT, PIN SEAT, STARTER NOZZLE, PICKUP NOZZLE AND PIT CAP, MINIMUM AND MAXIMUM AIR CALIBRATOR, THROTTLE VALVE, CONTROL SHAFT. DO NOT REMOVE THE SCREWS FIXING THE THROTTLE TO THE SHAFT. THE FIXING SCREWS ARE CAULKED AFTER ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.



## **WALBRO**

- To disconnect the carburettor from the engine, it is necessary to move the air filter and remove the gas control transmission, the automatic starter connection, the clamps fixing the carburettor to the filter box and to the intake manifold, the pipe feeding air to the membrane, and the intake union.

- Extract the carburettor and turn it to remove the screw with the water union and relevant pipes.



# ENGINE

**N.B.**

THIS OPERATION IS REQUIRED TO PREVENT LOSING THE SPRAY NOZZLE DURING THE CARBURETTOR CLEANING OPERATIONS. IF THE SPRAY NOZZLE IS FORCED INTO ITS SEAT, DO NOT REMOVE IT TO PREVENT DAMAGING IT.

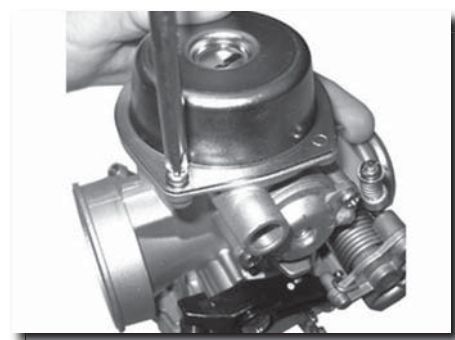
Remove the guard, the bracket and the starter by releasing the screw shown in the figure.



Remove the clamp and the cap with the membrane chamber aeration filter.



Remove the 4 fixing screws shown in the figure and the vacuum chamber cover.



# ENGINE

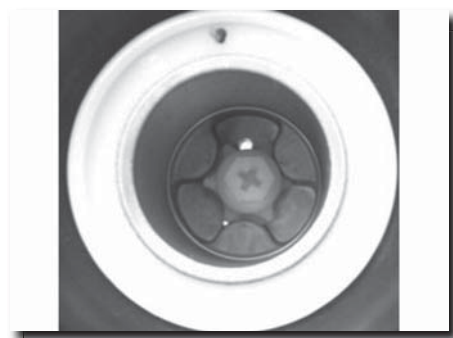
**N.B.**  
DURING THE COVER REMOVAL, BE CAREFUL TO THE SUDDEN  
PROJECTION OF THE SPRING.



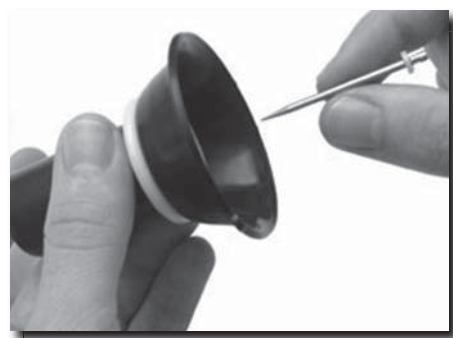
Remove the vacuum valve with the membrane



Loosen the coupling by 1/8 turn and remove it, remove the  
spring and the vacuum valve pin.



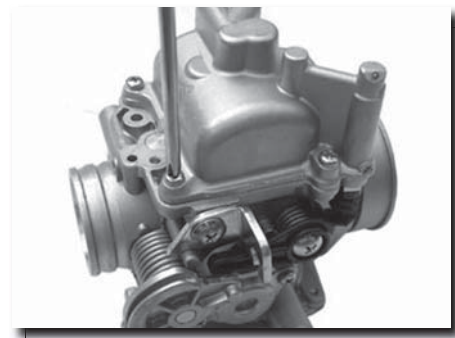
Remove the 4 screws shown in the figure.



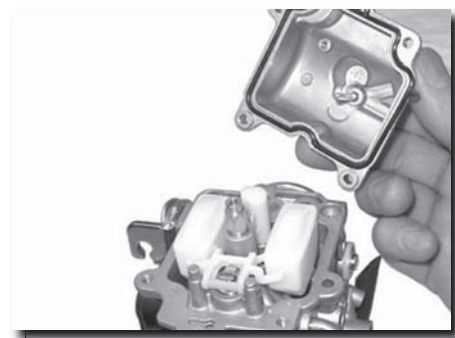


# ENGINE

Remove the basin with the pickup pump, control and gasket.



Remove the pickup pump with ring nut, the casing, the O-Ring and the spring from the basin as shown in the figure.



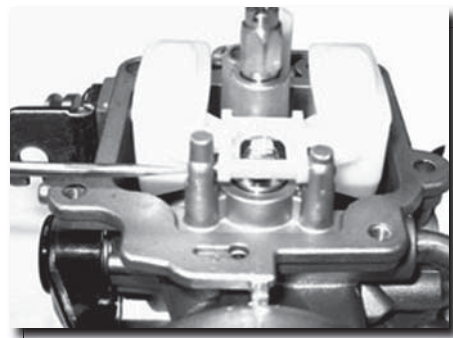
- Suitably support the carburettor and remove the float pin by a hammer from the gas control side.

- Remove the float and the pin.

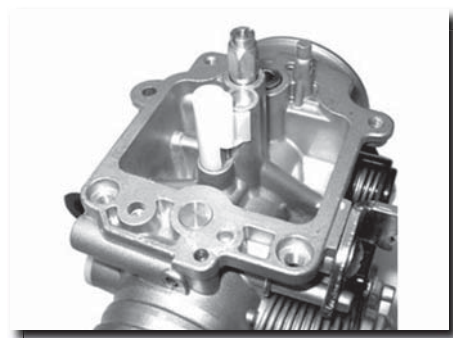


# ENGINE

Remove the cap conveying the fuel to the starter nozzle as shown in the figure.



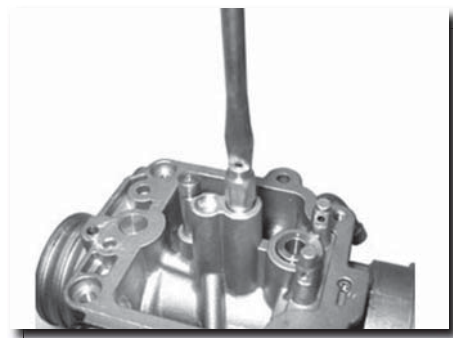
- Remove the maximum nozzle.
- Remove the emulsifier.



Remove the spray nozzle.

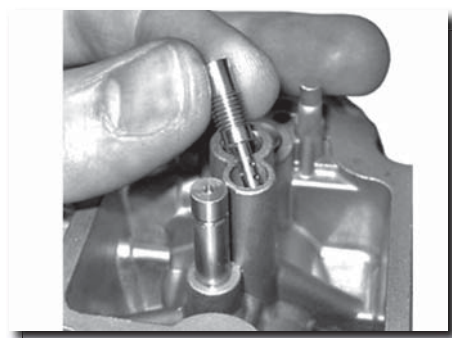
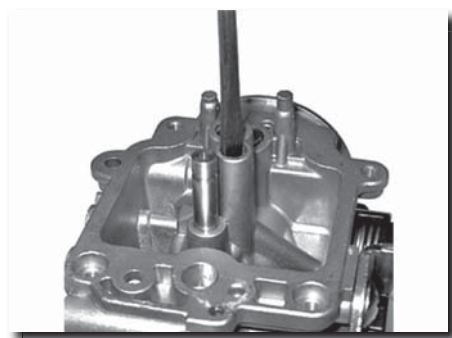
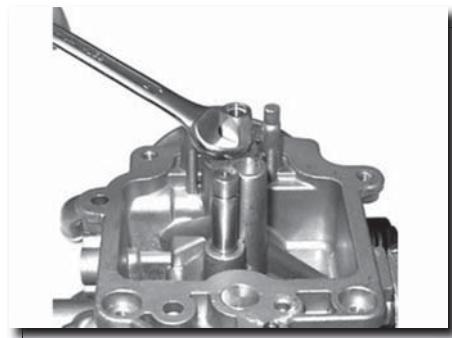
## **N.B.**

THIS OPERATION IS REQUIRED TO PREVENT LOSING THE SPRAY NOZZLE DURING THE CARBURETTOR CLEANING OPERATIONS. IF THE SPRAY NOZZLE IS FORCED INTO ITS SEAT, DO NOT REMOVE IT TO PREVENT DAMAGING IT.



# ENGINE

Remove the spray nozzle.

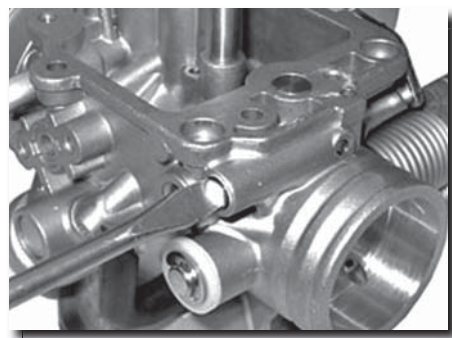


- Remove the minimum flow screw with the O-Ring, washer and spring.

- Remove the 2 fixing screws, the cover, the spring and the cut-off device membrane.

## CAUTION

DO NOT REMOVE THE COMPONENTS FIXED INTO THE CARBURETTOR BODY, SUCH AS: FUEL FEEDING DUCT, PIN SEAT, STARTER NOZZLE, PICKUP NOZZLE AND PIT CAP, MINIMUM AND MAXIMUM AIR CALIBRATOR, THROTTLE VALVE CONTROL SHAFT. DO NOT REMOVE THE SCREWS FIXING THE THROTTLE TO THE SHAFT. THE FIXING SCREWS ARE CAULKED AFTER ASSEMBLY AND THEIR REMOVAL DAMAGES THE SHAFT.



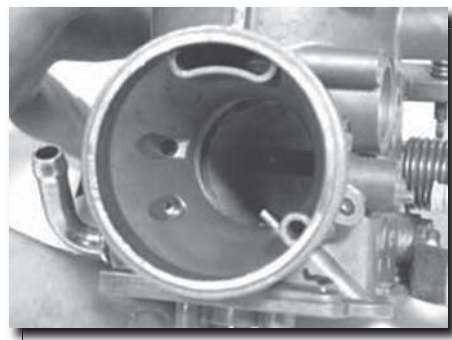
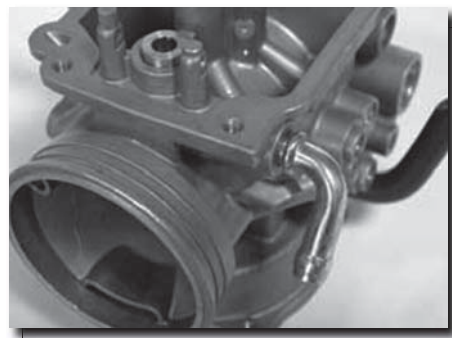


# ENGINE

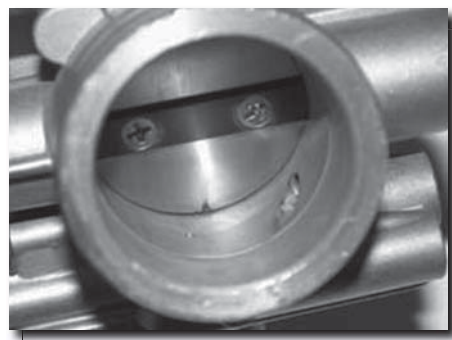
## REFITTING THE CARBURETTOR

### KEHIN

- Before proceeding to reassembly, carefully clean the carburettor body using fuel and compressed air.
- Be especially careful to the fuel inlet duct and the pin seat.
- For the maximum circuit, check the air calibration shown in the figure.



- For the minimum circuit, check the correct cleaning of the following points: air calibration, outlet section controlled by the flow screw, progression holes close to the throttle valve.
- For the starter circuit, carefully blow the nozzle connection duct since the nozzle support hides further internal calibrations that are not accessible.
- Carefully blow the pickup nozzle.



### N.B.

ITS OUTLET SECTION IS VERY SMALL AND FACES THE THROTTLE VALVE. A WRONG ORIENTATION OF THE NOZZLE CAUSES A POOR SPRAYING.

- Check that on the carburettor body there are 5 closing balls of the processing ducts.
- Check that the matching surfaces with the basin and the membrane exhibit no dents.
- Check that the vacuum valve seat is not deformed.



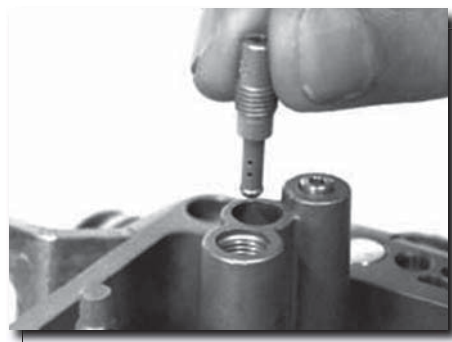
# ENGINE

- Check that the throttle valve and the shaft exhibit no abnormal wear.
- Check that the pin seat exhibits no abnormal wear.
- In case of anomalies, replace the carburettor.
- Check that the pickup pump rocker return spring is not slackened.

## **N.B.**

TO PREVENT DAMAGES, DO NOT INSERT METAL OBJECTS INTO THE CALIBRATED SECTIONS.

- Wash and blow the minimum nozzle and then replace it.



-Wash and blow the components of the maximum, emulsifier and nozzle circuit.

- Insert the spray nozzle into the carburettor body with the shorter cylindrical part facing the emulsifier

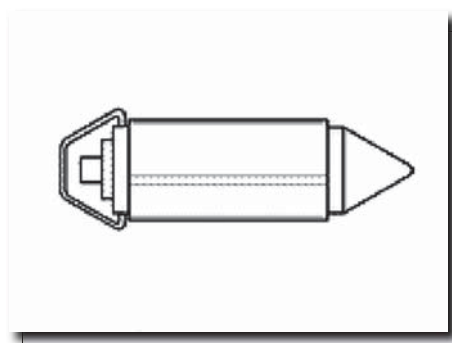
- Install the emulsifier making sure that the spray nozzle is properly inserted, then lock it.

- Install the maximum nozzle.



- Check that the conical pin exhibits no wear on the pin sealing surface and on the return spring.

- In case of wear, replace the pin.



# ENGINE

- Check that the float exhibits no wear on the pin seat or on the plate in contact with the pin, or fuel infiltrations.

- In case of anomalies, replace.

- Insert the float with the pin on the fuel feeding side.

## **N.B.**

BE CAREFUL TO THE PROPER INSERTION OF THE RETURN SPRING ON THE FLOAT PLATE.

- Remove the basin drainage screw and wash and blow the basin, be especially careful to the cleaning of the pickup pump ducts.

- Repeatedly actuate the pickup pump piston and blow with compressed air.

- Replace the pickup pump valves in a sequence:

### **INTAKE VALVE (A)**

- Spring
- Sphere
- Nozzle

### **DELIVERY VALVE (M)**

- Spring
- Nozzle
- Sphere

## **N.B.**

THE DELIVERY VALVE NOZZLE IS PROVIDED WITH A MILLING.

- Check the screw seal by pouring a small amount of fuel into the basin.

- Install a new gasket on the basin.

- Install the basin on the carburettor body and tighten the 4 screws.

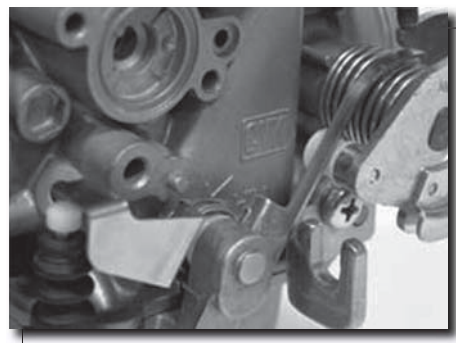
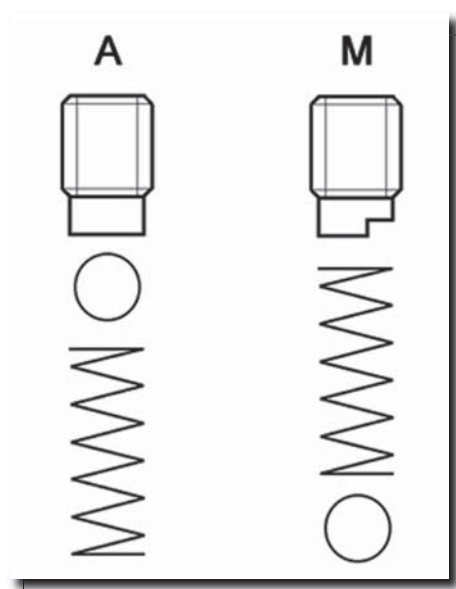
- Check that the control roller is free to rotate into its seat.

## **N.B.**

CHECK THE PROPER INSERTION OF THE GASKET.

## **N.B.**

AVOID ANY DEFORMATION OF THE PICKUP PUMP CONTROL ROCKER.



# ENGINE

- Wash and blow the flow screw.
- Check that the screw is free from deformation and/or oxidation.
- Assemble the spring on the screw.
- Tighten the flow screw on the carburettor body.
- The final position of the screw must be defined by the exhaust gas analysis.
- Prepare the carburettor for adjustment with the screw loosened by 2 turns from the closed position.

## WALBRO

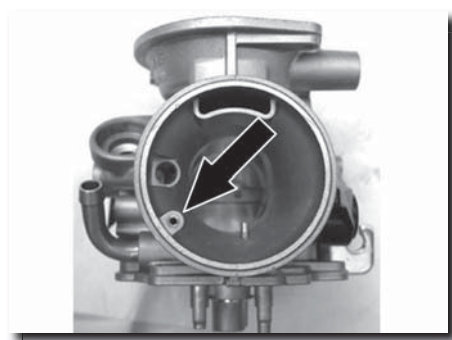
- Before proceeding to reassembly, carefully clean the carburettor body using fuel and compressed air.
- Be especially careful to the fuel inlet duct and the pin seat.

- For the maximum circuit, check the air calibration shown in the figure.
- Carefully clean the air holes shown in the figure.
- For the minimum circuit, check the correct cleaning of the following points: air calibration, outlet section controlled by the flow screw, progression holes close to the throttle valve.

**N.B.**  
THE MINIMUM AIR IS CONTROLLED BY TWO CALIBRATIONS. THAT OF THE CUT-OFF IS DIRECTLY OBTAINED IN THE CARBURETTOR BODY.

- For the starter circuit, carefully blow the nozzle connection duct since the nozzle support hides further internal calibrations that are not accessible.
- Carefully blow the pickup nozzle.

**N.B.**  
ITS OUTLET SECTION IS VERY SMALL AND FACES THE THROTTLE VALVE. A WRONG ORIENTATION OF THE NOZZLE CAUSES A POOR SPRAYING.



# ENGINE

- Check that on the carburettor body there are 5 closing balls of the processing ducts.
- Check that the matching surfaces with the basin and the membrane exhibit no dents.
- Check that the vacuum valve seat is not deformed.
- Check that the throttle valve and the shaft exhibit no abnormal wear.
- Check that the pin seat exhibits no abnormal wear.
- In case of anomalies, replace the carburettor.

## **N.B.**

TO PREVENT DAMAGES, DO NOT INSERT METAL OBJECTS INTO THE CALIBRATED SECTIONS.

- Wash and blow the minimum nozzle and then replace it.
- Wash and blow the components of the maximum, emulsifier and nozzle circuit.
- Insert the spray nozzle into the carburettor body with the shorter cylindrical part facing the emulsifier.
- Install the emulsifier making sure that the spray nozzle is properly inserted, then lock it.
- Install the maximum nozzle.
- Check that the conical pin exhibits no wear on the pin sealing surface and on the return spring.
- In case of wear, replace the pin.
- Check that the float exhibits no wear on the pin seat or on the plate in contact with the pin, or fuel infiltrations.
- In case of anomalies, replace.
- Install the float with the pin inserting the pin on the fuel feeding side.

## **N.B.**

BE CAREFUL TO THE PROPER INSERTION OF THE RETURN SPRING ON THE FLOAT PLATE.

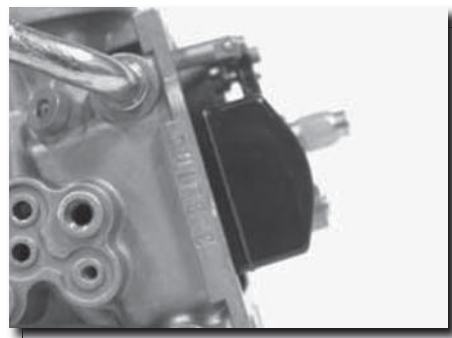


# ENGINE

## LEVEL CHECK

### KEHIN

- Place the carburettor tilted as shown in the figure,
- Check that the reference on the float is parallel to the basin matching surface.
- If the position is different, change the orientation of the metal pin control plate to obtain the position described above.



### WALBRO

- Check that the float matching surface is parallel to the basin surface with carburettor in upturned position.
- If the position is different, change the orientation of the metal pin control plate to obtain the position described above.
- When deforming the plate, check that it remains parallel to the floating pin.

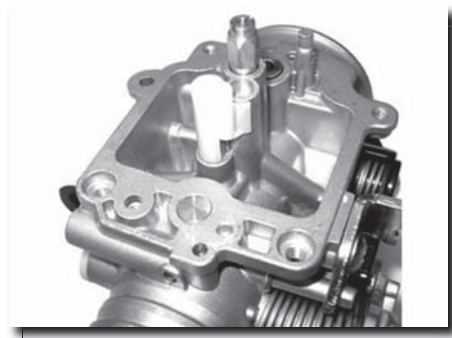
### N.B.

WITH THE CARBURETTOR IN UPTURNED POSITION, THE FLOAT WEIGHT MUST NOT OVERCOME THE THRUST OF THE CONICAL PIN SPRING. IF NOT SO, CHECK THAT THE FLOAT IS NOT BURDENED WITH INFILTRATIONS OF FUEL, AND REPLACE THE FLOAT OR THE CONICAL PIN, IF REQUIRED.

- Wash and carefully blow the fuel conveying cap and insert it on the starter nozzle.

### N.B.

FAILURE TO INSTALL THIS PART CAUSES A WORSE COLD START CHARACTERISTIC, SINCE THE STARTER NOZZLE WITHDRAWS OLD FUEL FROM THE BASIN BOTTOM.



# ENGINE

- Remove the basin drainage screw and wash and blow the basin, be especially careful to the cleaning of the pickup pump intake and delivery valve.

- Since the valves are unidirectional, carefully blow with compressed air in the intake valve from the basin internal side and into the pump piston seat for the delivery valve.

- Check that the pickup pump piston and relevant seat into the basin are free from wear.

- In case of wear, replace the defective parts.

- Check that the pickup pump piston contrast spring is not worn.

- Install a new O-Ring and a new bellows gasket, replace the piston unit on the basin.

- Install a new O-Ring on the basin drainage screw and tighten the screw.

- Check the screw seal by pouring a small amount of fuel into the basin.

- Install a new gasket on the basin.

- Install the basin on the carburettor body and tighten the 4 screws.

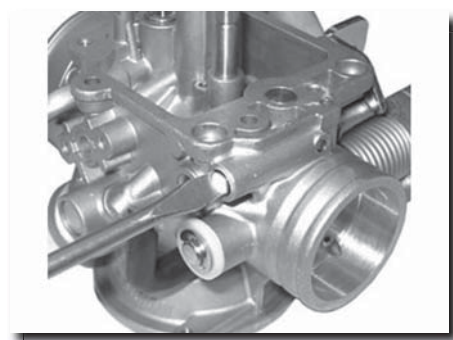
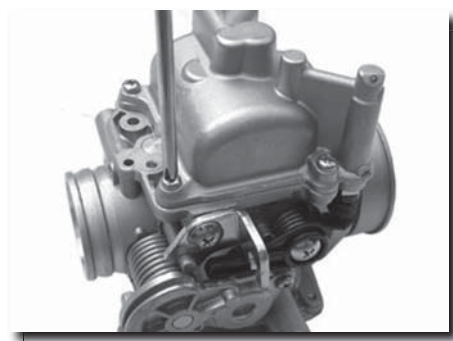
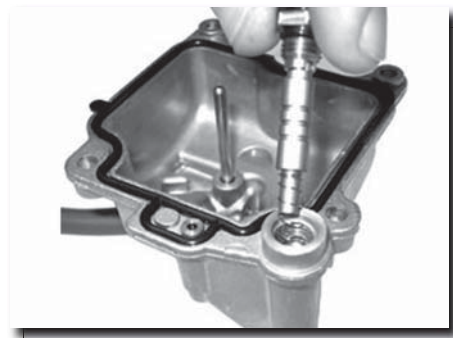
- Wash and blow the flow screw, install a new O-Ring.

- Pre-assemble the components on the screw in the following order: spring, washer, O-Ring.

- Tighten the flow screw on the carburettor body.

- The final position of the screw must be defined by the exhaust gas analysis.

- Prepare the carburettor for adjustment with the screw loosened by 3 turns from the closed position.



## ENGINE

- Check that the pickup pump control rocker is free from abnormal wear.

- Check that the rocker travel end screw protrudes by 3.2 mm.



- Check that the rocker return spring is not slackened.

- Pre-assemble the spring and the rocker as shown in the figure.

- Install the rocker on the carburettor keeping the throttle valve open.

- Tighten the rocker fixing screw.

- Make sure that the gear works properly.



### INSPECTING THE VALVE AND NEEDLE

#### **KEHIN**

- Check that the vacuum valve conical pin is free from wear.

- Check that the vacuum valve exhibits no scratches on the outside surfaces.

- Check that the vacuum feeding hole is not clogged.

- Check that the membrane is not broken or hardened, if not so, replace the entire valve.

- Insert the conical pin into the vacuum valve seat.

- Replace the vacuum gas valve on the carburettor body being careful to insert the pin into the spray nozzle.

#### **N.B.**

THE VALVE CAN BE INSERTED IN A SINGLE POSITION ONLY.



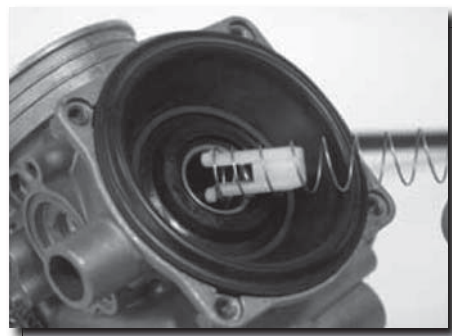


# ENGINE

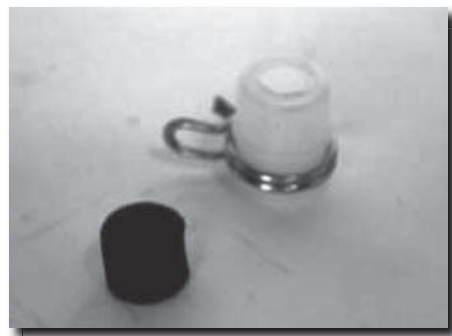
- Replace the spring with the pin lock.
- Replace the vacuum chamber cover checking the proper positioning of the spring into the housing on the cover.
- Tighten the screws at the prescribed torque.

## **Locking torques (N\*m)**

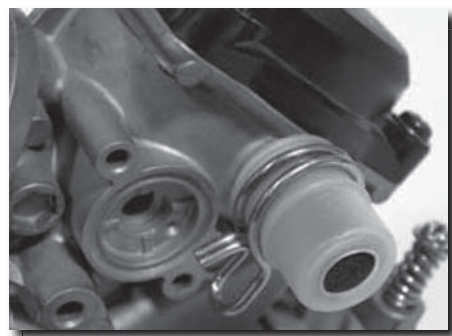
Vacuum chamber cover screws: XX N m



- Wash and blow the ambient pressure inlet filter sponge.



- Replace the filter and its clamp.



- Wash and blow the starter support.
- Install a new gasket on the carburetor body and tighten the 2 fixing screws.



# ENGINE

## WALBRO

- Check that the pin exhibits no wear and that the lock is in the third notch out of 3.
- Check that the vacuum valve exhibits no scratches on the outside diameter.
- Check that the 2 vacuum feeding hole are not clogged.

## N.B.

THE 2 HOLES HAVE A DIFFERENT DIAMETER.

- Check that the membrane is not broken or hardened, if not so, replace it.
- Replace the conical pin on the vacuum valve.
- Check the correct positioning of the spring on the pin and the snapping into the relevant seat.
- Install the coupling by turning it by 1/8 turn.

- Replace the vacuum gas valve on the carburettor body being careful to insert the pin into the spray nozzle.

- Time the vacuum valve rotation inserting the membrane tail into the relevant seat.

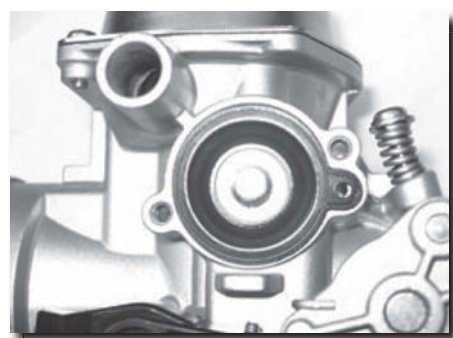
When the membrane is properly assembled to the valve, the main vacuum feeding hole is in axis with the diffuser, on the throttle valve side.

- Replace the spring on the valve.
- Replace the vacuum chamber cover matching the reference with the membrane orientation reference.
- Tighten the screws at the prescribed torque.
- Check the cut-off valve functionality. Check that the membrane is not broken or hardened. Check the free length of the spring.

## Characteristic

Walbro: Standard length  
24 mm

- Replace the membrane with the metal pin positioned on the valve.
- Replace the spring and the cover. The cover must have the vacuum inlet facing upwards



## INSPECTING THE AUTOMATIC CHOKE DEVICE

- Check that the automatic starter piston exhibits no scratches or oxidation.
- Check that the piston slides freely into the seat.
- Check that the piston sealing gasket exhibits no deformations.
- The starter must be more or less inserted according to the ambient temperature.
- Measure the projection of the piston as shown in the figure, and check the corresponding value.
- Ensure that the starter settles at ambient temperature.
- Install the starter on the carburettor checking the proper positioning of the O-Ring, insert the plate with the knurling resting against the starter, tighten the 2 fixing screws.
- Orientate the starter as in the figure.
- Install the safety casing.
- The actual heating time depends on the ambient temperature.
- If you detect projections, resistance or times differing from those prescribed, replace the starter.
- The starter should gradually disconnect by the electric heating.
- Check the starter resistance when settled at ambient temperature.
- Using a 12V battery, power the automatic starter and check that the piston reaches the maximum protrusion.

### **Characteristic**

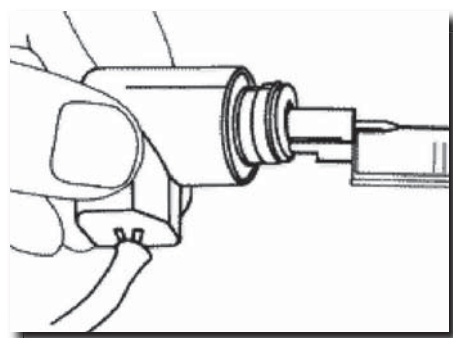
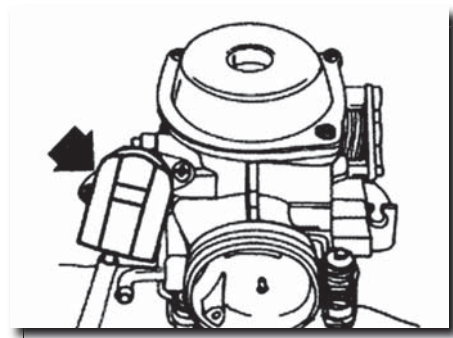
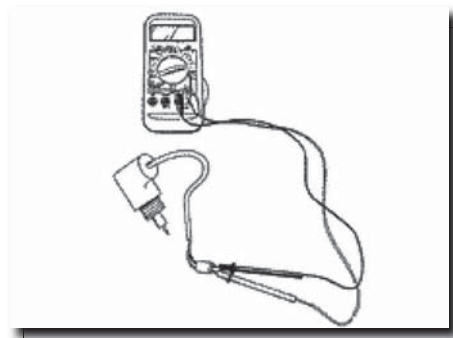
Automatic starter check: projection value  
12,5- 13 mm at about 20°C

Automatic starter check: Maximum projection  
18,5- 19 mm

Automatic starter check: Max time  
5 min

### **Electric characteristic**

Automatic starter check: Resistance about 30 Q



# ENGINE

## KEHIN

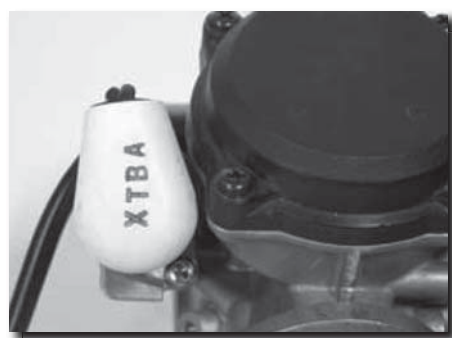
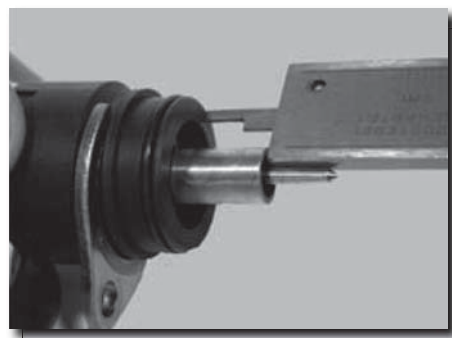
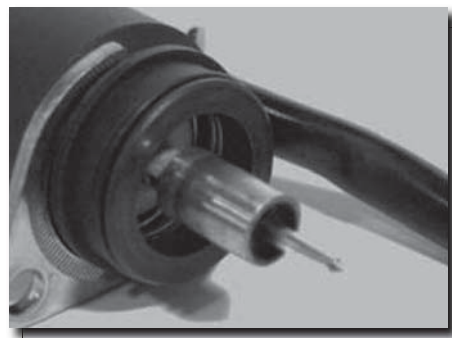
- Check that the automatic starter piston exhibits no scratches or oxidation.
- Check that the piston slides freely into the seat.
- Check that the piston sealing gasket exhibits no deformations.
- The starter must be more or less inserted according to the ambient temperature.
- Measure the projection of the piston as shown in the figure, and check the corresponding value.
- Ensure that the starter settles at ambient temperature.
- The starter should gradually disconnect by the electric heating.
- Check the starter resistance when settled at ambient temperature.
- Using a 12V battery, power the automatic starter and check that the piston reaches the maximum protrusion.
- The actual heating time depends on the ambient temperature.
- If you detect projections, resistance or times differing from those prescribed, replace the complete starter.
- Install the starter on the carburettor checking the proper positioning of the O-Ring, insert the plate with the knurling resting against the starter, tighten the fixing screw.
- Orientate the starter as in the figure.
- Install the safety casing.

## N.B.

TO PERFORM THIS CHECK, BE CAREFUL NOT TO GENERATE ANY SHORT CIRCUITS. TO THIS PURPOSE, USE A CABLE WITH SUITABLE TERMINAL FOR CONNECTING TO THE STARTER.

## Characteristic

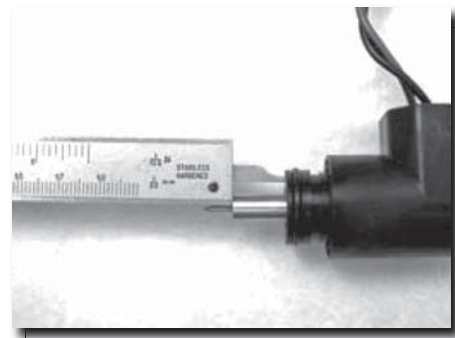
Automatic starter check Kehin max time  
5 min



# ENGINE

## WALBRO

- Check that the automatic starter piston exhibits no scratches or oxidation.
- Check that the piston slides freely into the seat.
- Check that the piston sealing gasket exhibits no deformations.
- The starter must be more or less inserted according to the ambient temperature.
- Measure the projection of the piston as shown in the figure, and check the corresponding value.
- Ensure that the starter settles at ambient temperature.
- The starter should gradually disconnect by the electric heating.
- Check the starter resistance when settled at ambient temperature (20 - 25 °C).
- Using a 12V battery, power the automatic starter and check that the piston reaches the maximum protrusion.
- The actual heating time depends on the ambient temperature.
- If you detect projections, resistance or times differing from those prescribed, replace the starter.



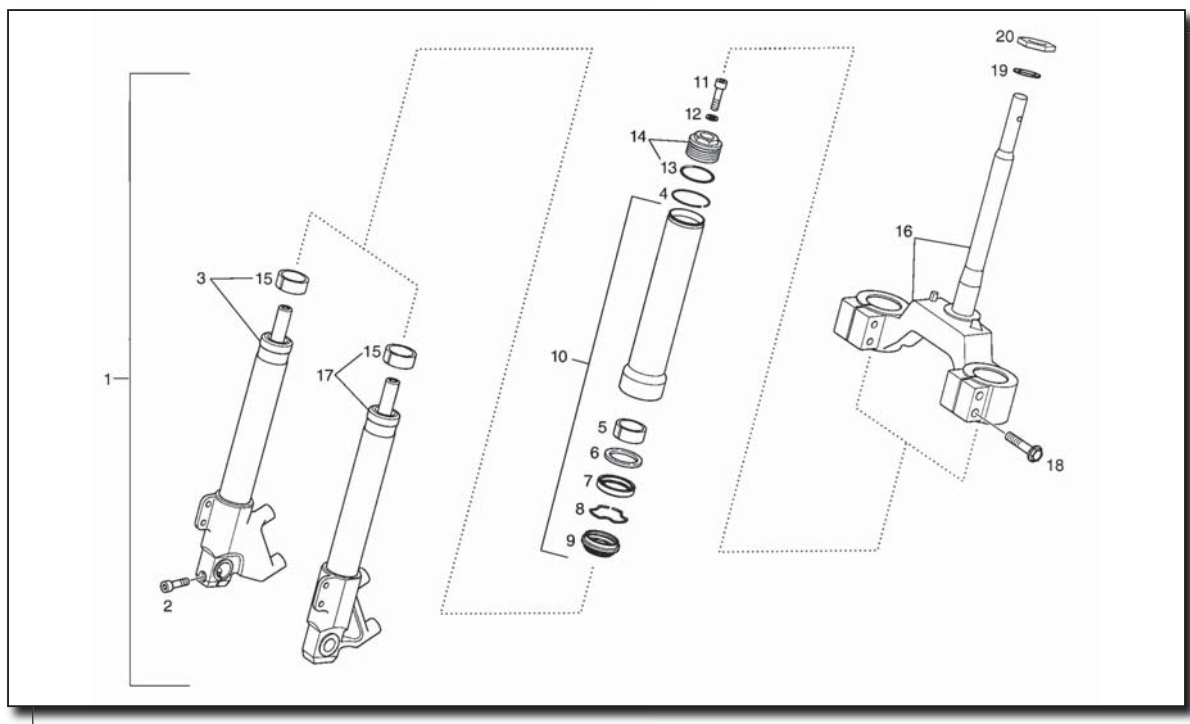
### Characteristic

Automatic starter check: projection value  
12,5 ÷ 13 mm at about 20°C

Automatic starter check Walbro maximum projection  
18,5 ÷ 19 mm

Automatic starter check Walbro max time  
5 min

## FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND



1	Fork assembly
2	M8x30 securing bolt
3	R-Hydraulic system with right-hand
4	Safety ring
5	Guide bush
6	Guide bush washer
7	Seal
8	Ring
9	Dust guard
10	R-Fork arm assembly
11	M10x30 securing bolt
12	Securing bolt washer
13	Cap ring
14	R-Fork cap assembly
15	Bottom inner arm bush
16	R-Plate stem assembly
17	R-Hydraulic system with left-hand
18	M10x50 securing bolt
19	Steering washer
20	Steering locknut

# FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

## **DISMANTLING FRONT SUSPENSION**

### **ATTENTION**

TO CARRY OUT THE PROCESS OF DISMANTLING THE FORKS WITHOUT REMOVING THEM FROM THE BOTTOM PLATE. TO DO SO, HOLD THE FORKS IN A BENCH VICE BY THE STEERING COLUMN, THEREBY PREVENTING THEM FROM BEING SCRATCHED.

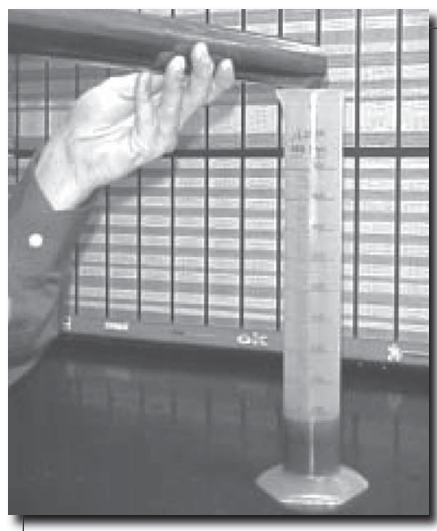
- Extract the top closing bolt.

- Remove the top bolt.

### **ATENCIÓN**

THE BOTTOM BAR OF THE FORKS WILL COME FREE. HOLD IT TO PREVENT IT FROM FALLING.

Have ready a suitable sized container in which to drain off the hydraulic fluid from each bar (pump the fork stem assembly in order to ensure it is completely drained).





## FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

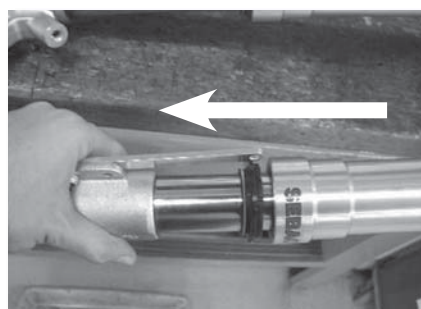
Extract the spring and the preload spacer.



- Extract the oil seal dust guard together with its security circlip.

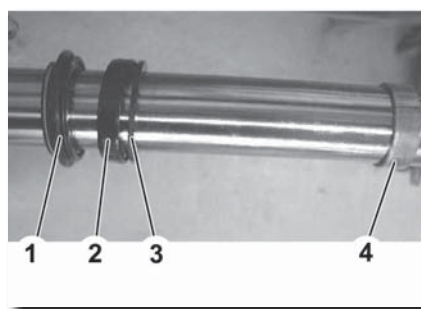


- Firmly separate the bar from the fork stem.



**Extract the elements:**

- Dust guard (1).
- Oil seal (2).
- Washer (3).
- Scraper (4).



# FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

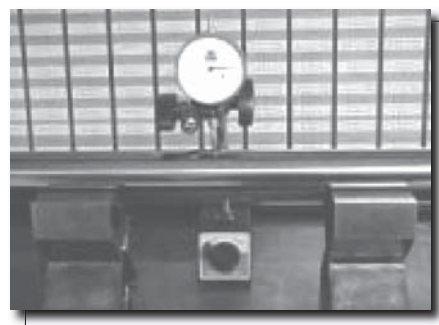
- Proceed with cleaning and degreasing all the front suspension components, so that they can be subsequently checked.



## INSPECTING THE FRONT FORKS

- Check the degree of wear on the suspension bar guide bush. Replace it in the event of it being damaged on over 30% of its total surface.
- With the aid of some X-shaped chocks and a comparison meter fitted on a fixed support, determine the degree of non-alignment of the bar.

**Service limit:**  
**0,4 mm.**



- Check the length of the suspension spring, as well as its distortion and/or lack of parallelism.

- Check the state of the rebound spring and the airtight O-ring. Replace them in the event of evident distortion or damage.

Clean and degrease all the elements making up the assembly, ready for reassembly.

## FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

Reassemble the assembly, paying special attention to the tightening of the fork stem, as well as the fitting of the oil seal, putting a little oil on its edges and inserting it with the aid of the special tool. Refill the hydraulic fluid and do not forget to insert the preload bush between the spring and the closing plug.

FREE LENGTH OF SPRING (MM)	cm <sup>3</sup> OIL / BAR	TYPE OF OIL
180 ± 2	200 ± 2	SAE 7,5 W

### Fork elements tightening torques:

#### - Steering-chassis lock

8 ÷ 10 N.m (0.8 ÷ 1 m.kg)

#### - Fork stem closing

15 ÷ 19 N.m (1.5 ÷ 1.9 m.kg)

### 1. Refit all the components:

- Readjust forks to the chassis.
- Refit the front fairing.
- Connect the headlight cables, the turn indicators and the dashboard.

### NOTA

TIGHTEN ALL BOLTS TO THEIR NOMINAL TORQUE. (SEE INFORMATION GENERAL).

### 2. Dismantle:

#### Front fairing

- Disconnect lighting connections.
- Disconnect dashboard connections.

### 4. Separate:

Forks wheel assembly (downwards).

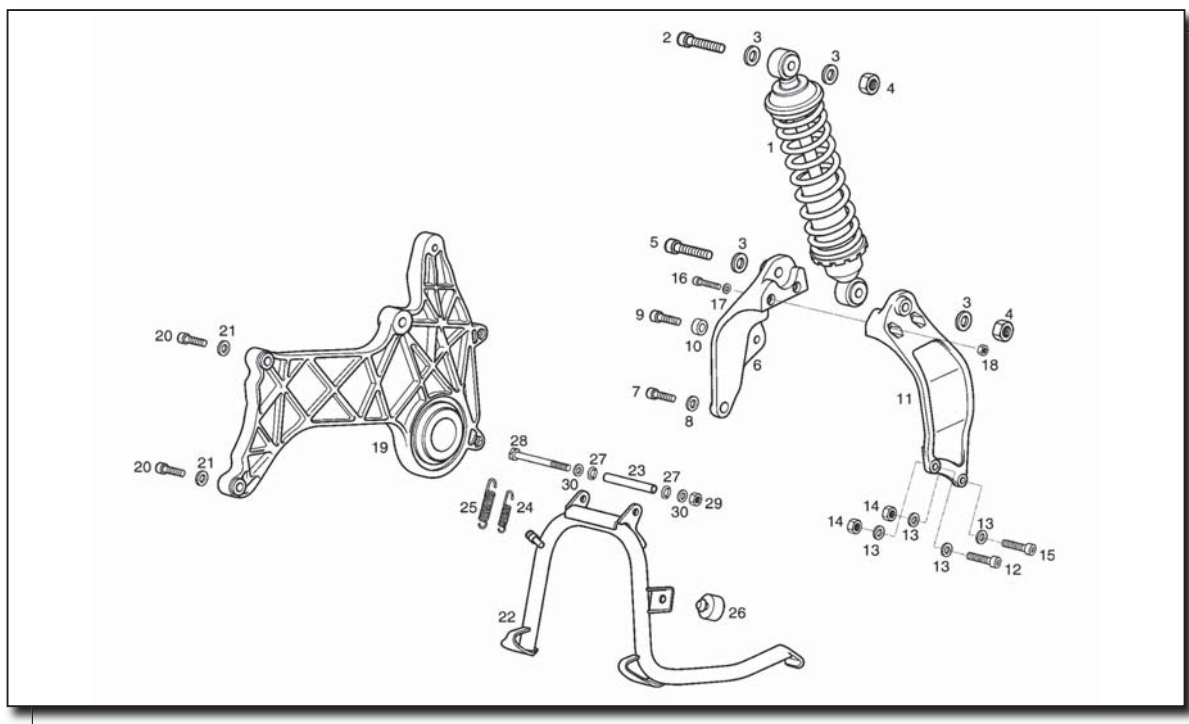
### 5. Check:

- Functioning (top and bottom bearings).
- Push the handlebars down several times.

Irregular functioning => **Repair.**

See "FRONT FORKS" in CHAPTER 6.

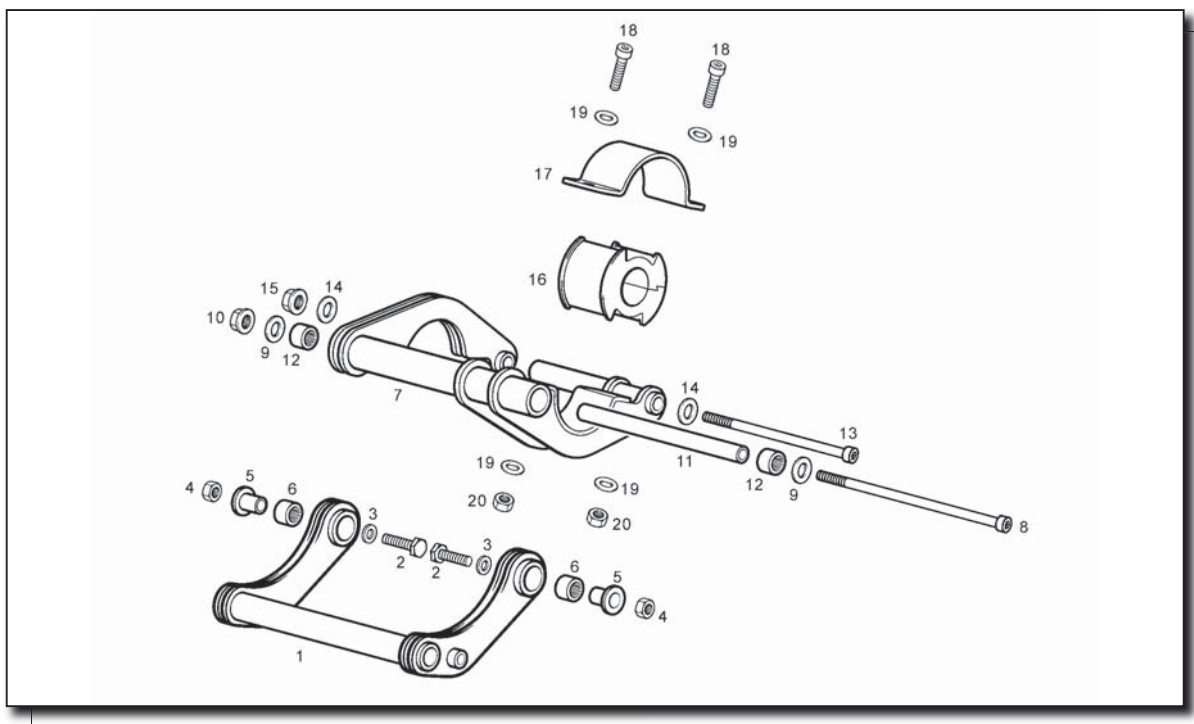
# FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND



1	Shock absorber
2	10M 150x55 Allen bolt
3	D10 washer
4	10M150 nut
5	10M 150x80 Allen bolt
6	Shock absorber right-hand support bracket
7	8M 125x30 bolt
8	D8 washer
9	12M 175x35 Allen bolt
10	Bush
11	Shock absorber left-hand support bracket
12	8M 125x55 bolt
13	D8 washer
14	8M125 nut
15	8M 125x65 bolt
16	8M 125x55 bolt
17	D8 washer
18	8M125 nut
19	Rear suspension arm
20	8M 125x45 bolt
22	D8 washer
23	Stand
24	Stand separator tube
25	Inner stand spring
26	Outer stand spring

26	Stand stop rubber
27	O-ring
28	10M 150x130 hexagonal bolt
29	10M 150 hexagonal nut
30	D10 washer

## FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND



1	Front engine support
2	14Mx200x70 hexagonal bolt
3	D15 flat washer
4	14M200 hexagonal nut
5	Engine support separator bush
6	Needle bush
7	Engine rear support
8	Engine securing bolt
9	D10 washer
10	10M50 self-locking nut
11	Engine support separator tube
12	Needle bush
13	Engine to engine support securing bolt
14	D10 washer
15	10M150 self-locking nut
16	Engine support Silentblock
17	Silentblock securing clamp
18	8M125x20 bolt
19	D8 washer
20	8M125 nut

# FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

## **DISMANTLING**

1. Place the motorcycle on a flat surface.

### **WARNING**

SUPPORT THE MOTORCYCLE FIRMLY, IN SUCH A WAY THAT THERE IS NO RISK OF IT FALLING.

Before proceeding with dismantling, support the machine on a block of wood placed under the chassis.

### **2. Extract:**

- Rear wheel.

- Joint elements from the image described on the previous page.

- Leave the shock absorber hanging to inspect the flange or to dismantle the engine.

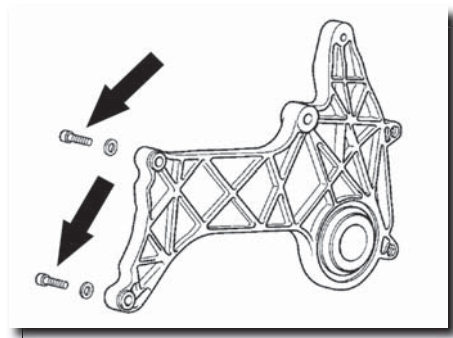
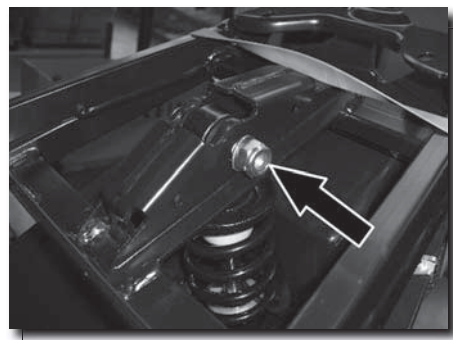
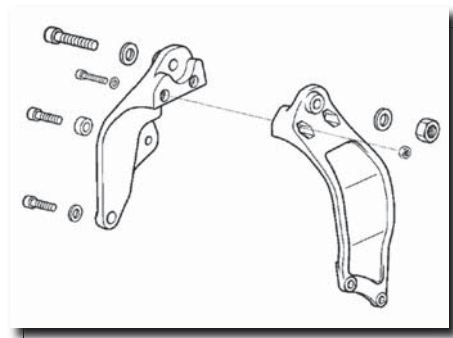
### **WARNING**

FOR COMPLETE DISMANTLING, ACCESS THE SEAT INNER DRAWER. EXTRACT THE PLASTIC DRAWER AND EXTRACT THE TOP SHOCK ABSORBER SECURING DEVICE. REMOVE IT ONCE THIS HAS BEEN DONE.

### **3. Extract:**

- The joints indicated in the image.

- Remove the rear suspension arm to inspect it.



## **INSPECTION**

### **1. Inspect:**

- Swinging arm and engine support assembly.

Play => Tighten the joint shaft nut or renew the bushes on the engine support/ engine support needle bearing assembly.

- Vertical movement of the swinging arm

Uneven movement /warping/stains => renew the bushes on the engine support/ engine support needle bearing assembly.

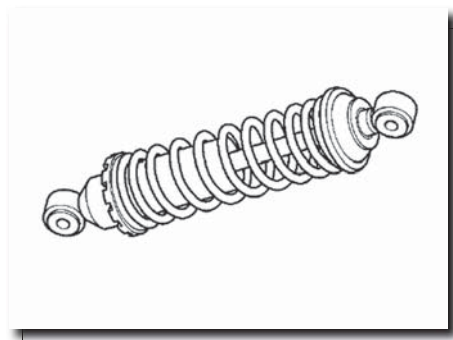
- Horizontal movement of the swinging arm

Uneven movement /warping/stains => renew the bushes on the engine support/ engine support needle bearing assembly.

### **2. Inspect:**

- Shock absorber

Oil leaks/damage => Renew the shock absorber.

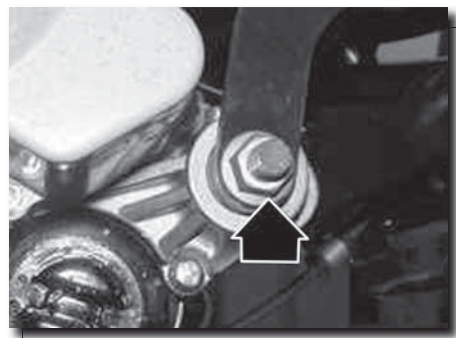


# FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

## SWING-ARM

### REMOVAL

- Put the vehicle on the centre stand.
- Suitably support the engine.
- Unscrew the nut shown in the figure and pull out the pivot on the left side.



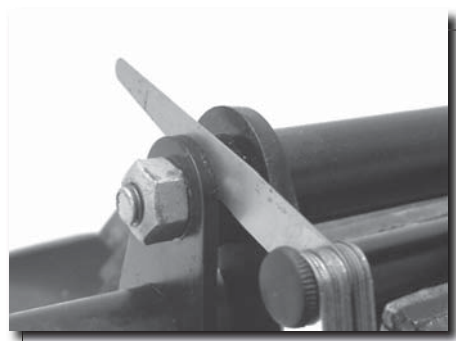
- Unscrew the nut on the left side of the vehicle and remove the pivot on the opposite side.

- Ensure engine-side and frame-side swing-arm braces are free to rotate freely about pivot.
- Check the axial play between the two swingarms using feeler gauges.

### Characteristic

Max allowable limit after use  
1 mm

Standard clearance  
0,40 ÷ 0,70 mm

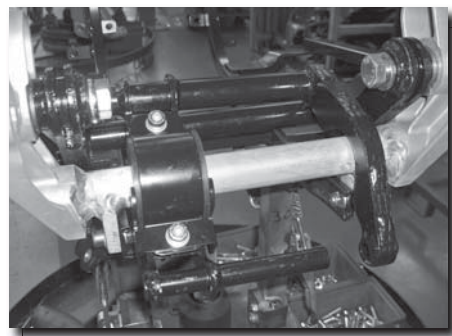




# FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

## **CHECKING THE SWINGING ARM**

- Accurately grease the roller cages
- Insert the spacers
- Install the two halves with their respective bolts in the position indicated in the picture.
- Install the bolt in the direction shown in the picture.
- Position the frame-side swing-arm with the protrusion facing the silent-block, as shown in the picture.



## **Recommended products**

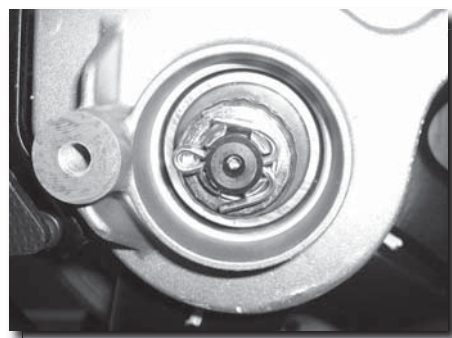
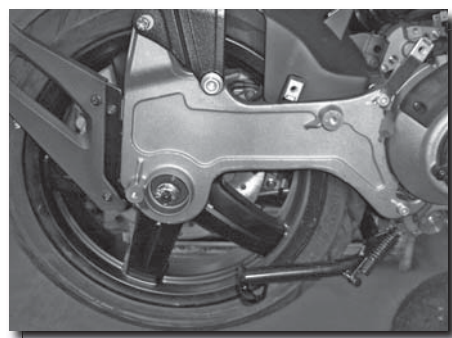
Grease for steering wheel bearings and pin seats

Lithium soap and zinc oxide grease NLG12 for the oscillating arm

## **EXHAUST BRACKET**

### **REMOVAL**

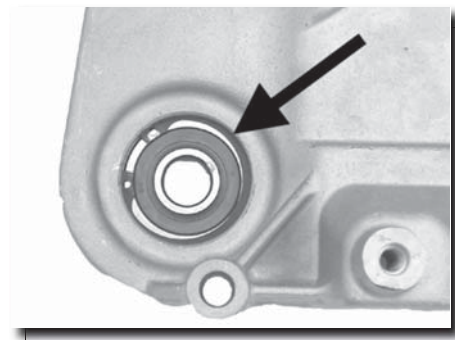
- Loosen and remove the lower shock-absorber fixing bolt from the swing-arm bracket.
- Loosen the swing-arm fixing screws from the engine.
- Remove cotter pin and safety cap; Loosen wheel axle nut; to prevent wheel rotation, apply rear brake.
- Remove swing-arm mounting bracket.
- Remove silencer assembly.



# FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

## OVERHAUL

- Remove the spring clip shown in the picture.

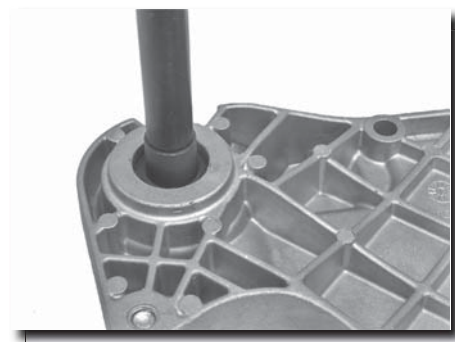


- Suitably support the silencer mounting bracket.
- Using special tool, extract bearing from its housing as shown in the picture.

### Specific tooling

020376Y Handle for punches

020456Y Ø 24 mm adaptor

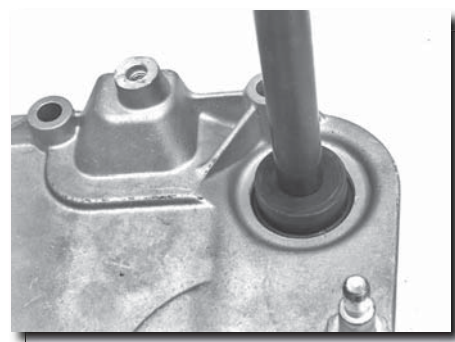


- Using a heat gun, heat up the bearing housing.
- Using the special drift, insert a new bearing in the housing as shown in the picture.

### Specific tooling

020376Y Handle for punches

020151Y Air heater



## REFITTING

- For the reassembly, follow the operations indicated above in the reverse order, complying with the tightening torques.

### Locking torques (N\*m)

Rear wheel spindle nut 104 ÷ 126

Silencer support arm screws on engine (\*) 20 ÷ 25

Shock absorber bottom fixing 33 ÷ 41

# FORKS, SHOCK ABSORBER, ENGINE SUPPORT AND STAND

## **CENTRE-STAND**

- Remove the two stand return springs.
- Unscrew the nut shown in the figure.
- Remove the pivot from the right-hand side.
- Remove the stand.
- After refitting the stand, tighten the nut with the prescribed torque.

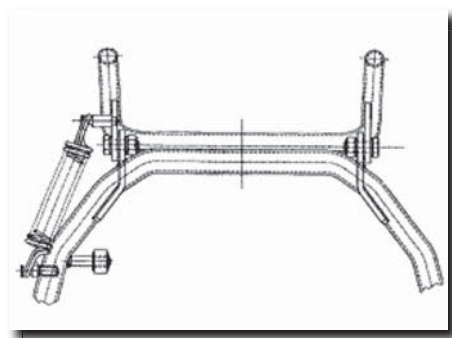


### **Locking torques (N\*m)**

Central stand bolt  $25 \div 30$

## **REMOVAL**

- Release the springs.
- Loosen the nut.
- Extract the screw.

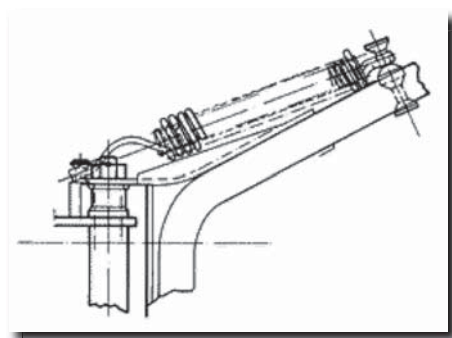


## **RE-ASSEMBLY**

Insert the sealing rings on the side stand support tube; perform the above operations in the reverse order, then move the sealing rings to their seats.

### **CAUTION**

LUBRICATE THE FOLLOWING PARTS WITH GREASE TUTELA Z2: SPRING PINS, BUSHES ON STAND FIXING BRACKETS.



### **Recommended products**

Grease for steering wheel bearings and pin seats

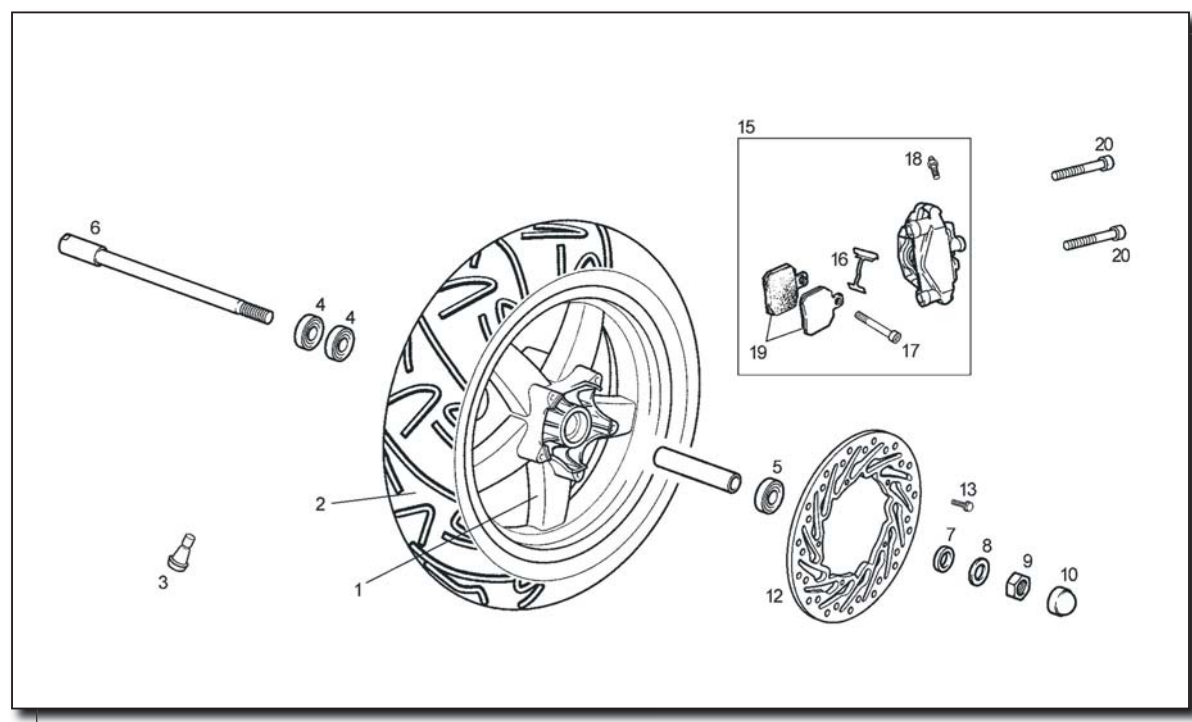
Lithium soap and zinc oxide grease NLG12 for the oscillating arm

### **Locking torques (N\*m)**

Fastening screw  $20 \div 25$

# FRONT WHEEL AND BRAKE

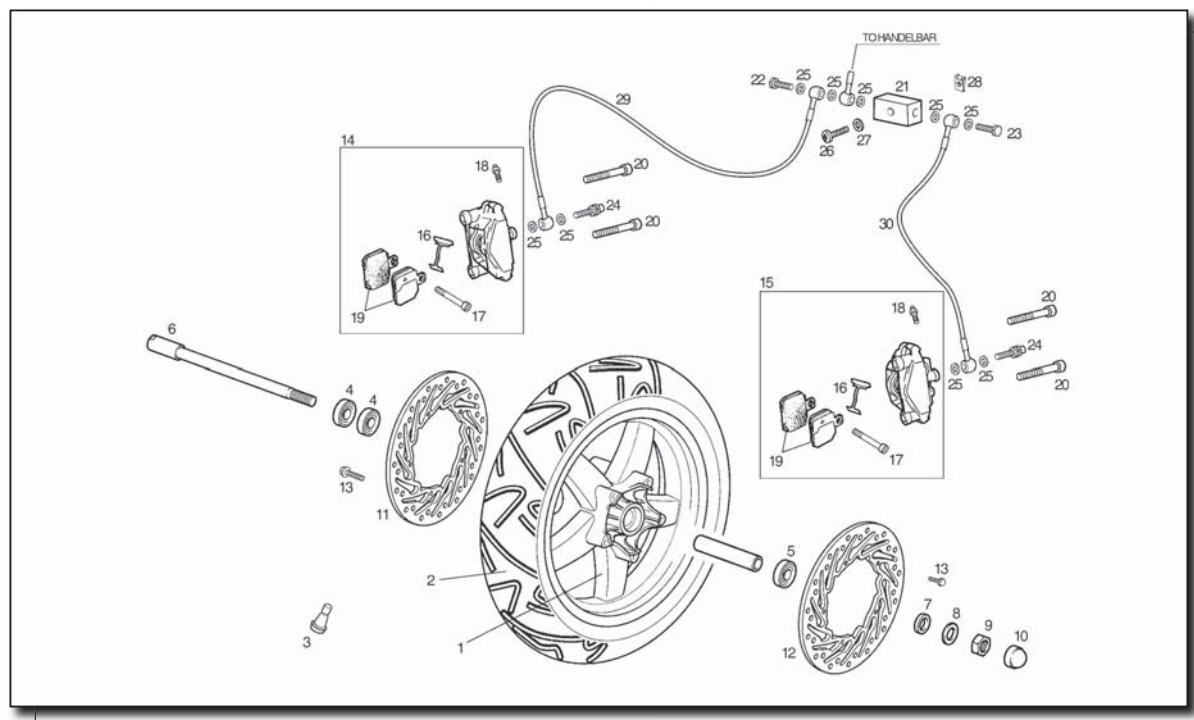
## REAR WHEEL 125 C.C.



1	Front wheel
2	Tyre
3	Valve, tyre
4	Bearing
5	Bearing
6	Front wheel axle
7	Bush
8	Washer
9	Nut
10	Protector
11	Cover
12	Front brake disc
13	Screw
14	Screw
15	Brake caliper
16	Spring
17	Screw
18	Bleed
19	Set of brake pads
20	Screw

# FRONT WHEEL AND BRAKE

## REAR WHEEL 250 C.C.



1	Front wheel
2	Tyre
3	Valve tyre
4	Bearing
5	Bearing
6	Front wheel axle
7	Bush
8	Washer
9	Nut
10	Protector
11	Front brake disc
12	Front brake disc
13	Screw
14	Brake caliper
15	Brake caliper
16	Spring
17	Screw
18	Bleed
19	Set of brake pads
20	Screw
21	Distributor
22	Tube connector
23	Tube connector
24	Tube connector
25	Washer

26	Screw
27	Washer
28	Nut
29	Pipe
30	Pipe

# FRONT WHEEL AND BRAKE

## DISMANTLING

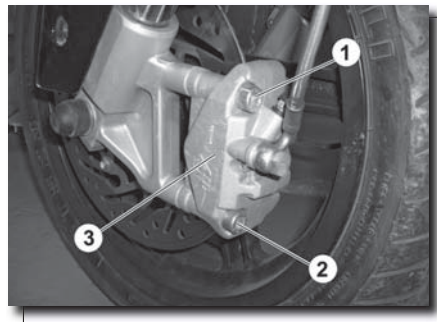
### **WARNING**

- ENSURE THAT THE MOTORCYCLE IS SUPPORTED FIRMLY AND THERE IS NO RISK OF IT FALLING.

- PLACE THE MOTORCYCLE ON A FLAT SURFACE.

### **1. Extract:**

- Front brake calliper (Bolts 1 and 2).

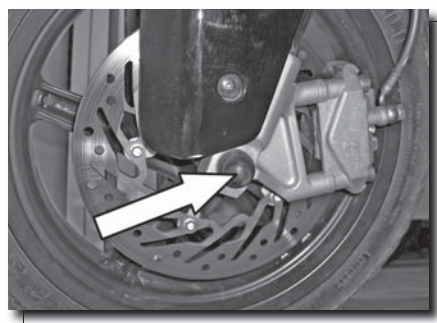


### **2. Extract:**

- Nut protecting cover.  
- Nut (left side).

### **3. Raise:**

- Front wheel  
(Put a suitable support under the engine).



### **4. Extract:**

- Front wheel axle.  
- Front brake disk assembly.  
- Dustguard/spacer.  
- Front wheel.

## INSPECTING THE FRONT WHEEL

### **1. Inspect:**

- Front wheel axle. (By rolling it on a flat surface).

Warping => **Replace.**

### **WARNING**

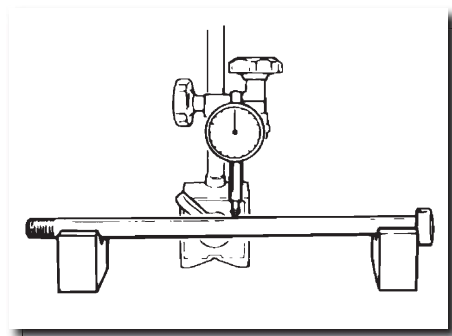
DO NOT TRY STRAIGHTENING A WARPED AXLE.

**Wheel axle warp limit:**  
0,25 mm

### **2. Inspect:**

- Neumático delantero.

Damage/wear => **Replace.**



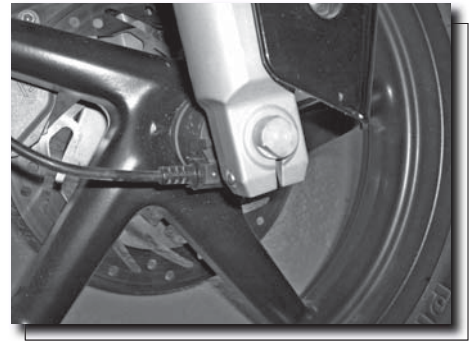


# FRONT WHEEL AND BRAKE

## 3. Check:

- Spokes.

Warps/damage => **Replace.**



## 4. Measure:

- Distortion of the front wheel

Above that specified => **Replace.**

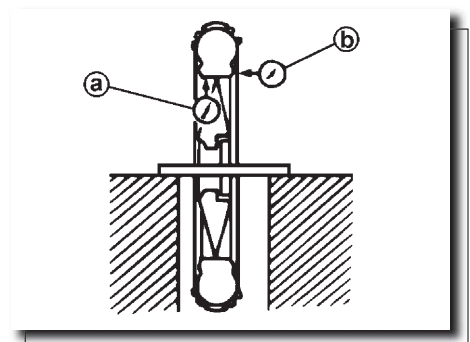
Distortion limits for the front wheel:

Radial (a):

0,5 mm

Lateral (b):

0,8 mm



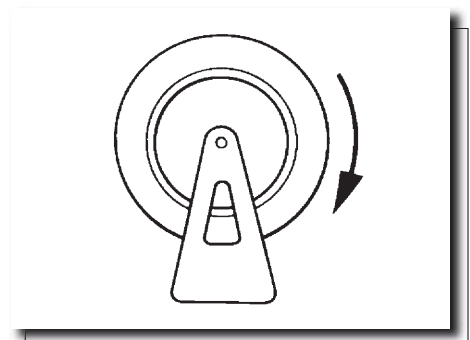
## 5. Check:

- Front wheel bearings.

Bearings allow play in the wheel hub or the wheel does not turn freely => **Replace.**

- Retaining rings.

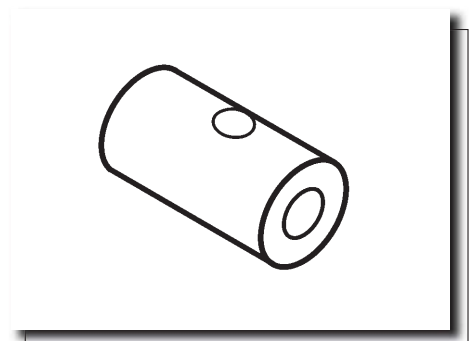
Damage/wear => **Replace.**



## 6. Inspect:

- Spacer.

With scratches/worn => **Replace the spacer and the retaining ring.**





# FRONT WHEEL AND BRAKE

## **DISMANTLING THE FRONT DISK CALLIPER**

- Loosen the banjo bolt (1) from the bottom end of the brake pipe and tighten it slightly.
- Unscrew the calliper mounting bolts (2) and separate the calliper (3) backwards from the disk.

### **PRECAUTION**

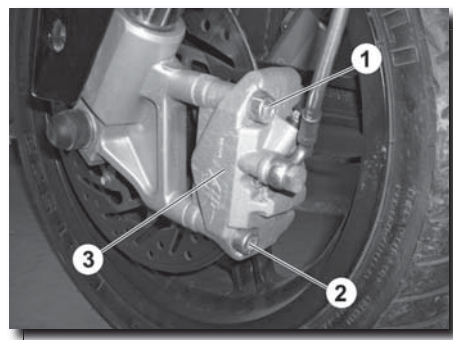
CLEAN OFF ANY SPILT BRAKE FLUID REMAINS IMMEDIATELY.

### **Fitting the front calliper:**

- Fit the bottom end of the brake pipe and the calliper.
- Tighten to nominal torque.
- Tighten the brake banjo bolt.
- Check brake fluid level.
- Bleed the brake system pipe (consult "Bleeding the brake system pipe" in this chapter).
- Check the condition of the braking force to see if any resistance is noted or any loss of fluid.

### **WARNING**

DO NOT ATTEMPT TO RIDE THE MOTORCYCLE UNTIL THE BRAKE LEVER IS OPERATING PROPERLY. PUMP THE LEVER UNTIL THE PADS ARE AGAINST THE DISK. IF NOT, THE BRAKES WILL NOT WORK THE FIRST TIME THE LEVER IS USED.



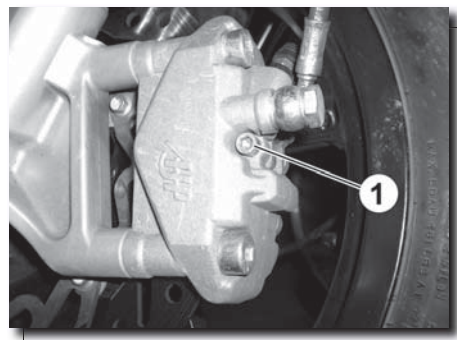
# FRONT WHEEL AND BRAKE

## Extracting the front brake pads.

- Remove the front brake calliper (see "Dismantling the front brake calliper" in this chapter).

### Extract:

- Pad springs (1).
- Pin.
- Brake pads (2).

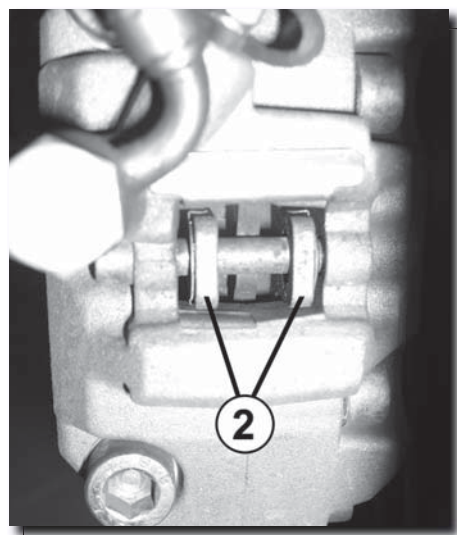


## Fitting the front brake pads

- Press the calliper pistons in manually.
- Fit the pads inside the calliper.
- Adjust the pad springs.

### WARNING

DO NOT ATTEMPT TO RIDE THE MOTORCYCLE UNTIL THE BRAKE LEVER IS OPERATING FULLY. THIS IS ACHIEVED BY PUMPING THE LEVER UNTIL THE PADS ARE AGAINST THE DISK. IF NOT, THE BRAKES WILL NOT WORK THE FIRST TIME THE LEVER IS USED.

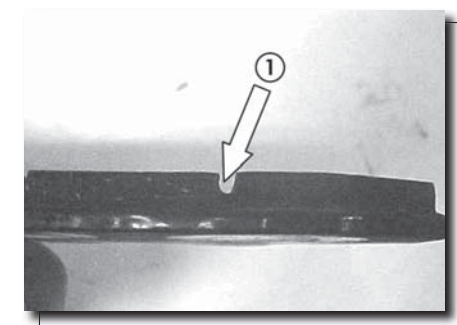


## Inspecting the pads for wear

- Remove the front brake pads.

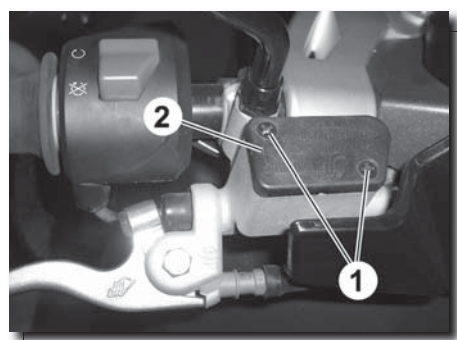
- Examine both brake pads.

If the wear has caused the wear indicating groove (1) to disappear, both pads must be renewed.



## Extracting the front brake cylinder.

- Extract the bolt (1) and remove the flexible pipe from the brake cylinder reservoir.



# FRONT WHEEL AND BRAKE

## N.B.

THE MASTER CYLINDER (1) IS INCORPORATED INTO THE FRONT BRAKE LEVER ASSEMBLY.

- EXTRACT THE SCREWS (2) AND THE FRONT BRAKE LEVER ASSEMBLY.

## PRECAUTION

CLEAN OFF ANY SPILT BRAKE FLUID REMAINS IMMEDIATELY.

### Extract:

- Brake lever mounting bolt and nut.
- Brake lever.

### Fitting the front master cylinder:

- Fit the brake lever assembly and tighten the securing screw.

- Tighten the flexible brake pipe bolt.

- Bleed the brake system pipe (consult "Bleeding the brake system pipe" in this chapter).

- Check the condition of the braking force to see if any resistance is noted or any loss of fluid.

Checking the brake lever master cylinder (visual check):

- Extract the master cylinder (consult "Extracting the front master cylinder" in this section).

- Dismantle the front master cylinder:

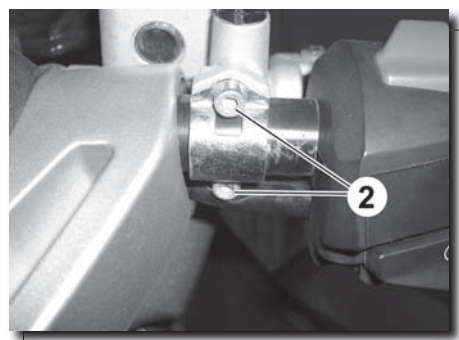
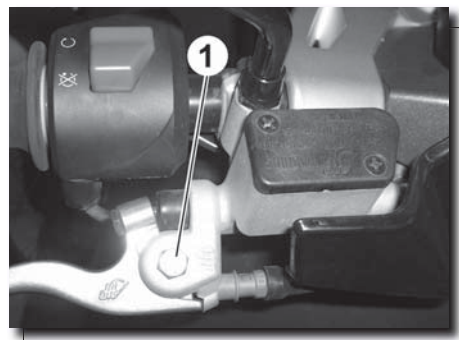
- Check that there are no scratches, corrosion or holes on the inner walls of the master cylinders and on the outer part of each piston.

- If any damage is discovered on the master cylinder or on the pistons, change them.

- Examine the primary seal and secondary seal.

- If the seal is worn, soft (perished) or swollen, change the piston assembly to renew the seals.

- If fluid loss is noticed at the brake lever, change the seals.



# FRONT WHEEL AND BRAKE

## Checking the brake calliper main cylinder:

- Check that the anti-dust boots are not damaged. If they are, change them.
- Check that the piston return is not damaged. If it is, renew it.
- Check that the relief port and feed port are not blocked. If the relief port is blocked, the brake pads will bind on the disk. Inject compressed air to clean the ports.

## Extracting the brake disk:

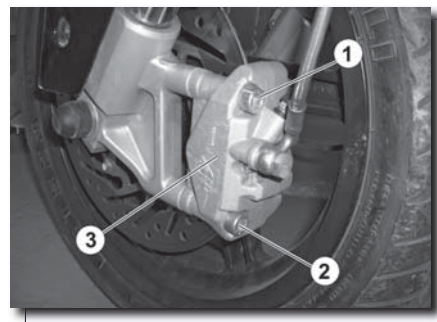
- Remove the front wheel.
- Unscrew the mounting bolts and extract the disk.

## Fitting the brake disk

- Fit the brake disk onto the front wheel so that side (2) faces outwards.
- Apply a temporary blocking device to the threads of the brake disk mounting bolts(1).
- Tighten the front brake disk mounting bolts(1).

## Nominal tightening torque:

$0.8 \div 1 \text{ m.kg}$  ( $8 \div 10 \text{ N.m}$ )



## Wear to the brake disk:

- Measure the thickness of the disks (A) at the point where they are most worn.
- If the disk is more worn than specified in the service limit, renew it.

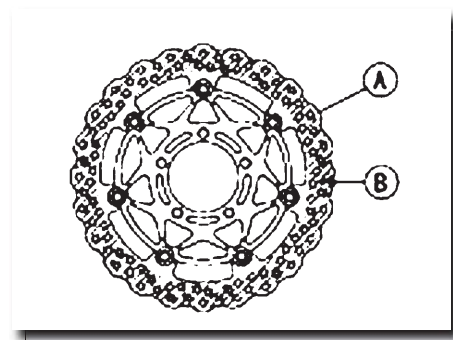
Measurement area (B).

## Standard thickness of the front brake disk.

$3.3 \div 3.6 \text{ mm}$ .

## Service limit:

$3.1 \text{ mm}$



# FRONT WHEEL AND BRAKE

## **Brake disk distortion:**

- Raise the motorcycle on the jack so that the tyre is clear of the ground.
- To check the front disk, turn the handlebars completely to one side.
- Place a dial calibrator against the disk (A) as shown, and measure the disk's deviation from centre as the tyre is turned by hand (B).
- If the deviation from centre exceeds the service limit, renew the disk.



## **Disk deviation from centre:**

### **Standard:**

less than 0.15mm

### **Service limit:**

0,3 mm

## **Bleeding the brake system pipe**

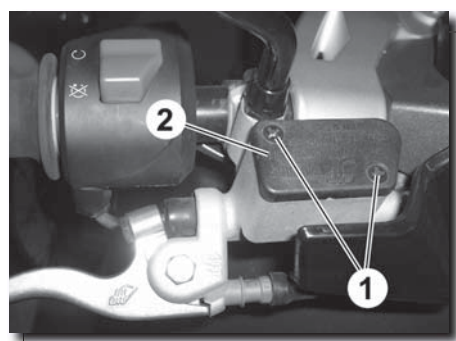
The brake fluid has a very low compression coefficient, with the result that almost all the movements of the brake lever are transmitted directly to the calliper for braking. Air however compresses easily. When air enters the brake system pipes, the movement of the brake lever is partially used up in compressing the air. This causes the lever to feel spongy and leads to a loss of braking power.

## **WARNING**

BE SURE TO BLEED AIR OUT OF THE BRAKE SYSTEM WHEN THE BRAKE LEVER FEELS SPONGY AFTER CHANGING THE BRAKE FLUID OR WHEN THE BRAKE SYSTEM PIPE HAS BEEN LOOSENED FOR ANY REASON.

### **Extract:**

- Bolts (1).
- Reservoir cap (2).
- Fill the reservoir with brake fluid up to the top reservoir line.
- With the cap removed, pump the brake lever slowly several times until no bubbles can be seen rising through the liquid.



# FRONT WHEEL AND BRAKE

Purge the air completely from the master cylinder using this procedure.

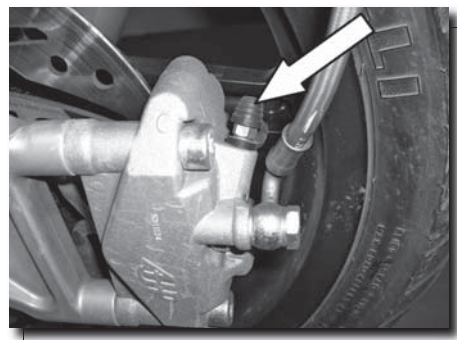
- Remove the transparent plastic cap from the bleed nipple and place the other end of the pipe in a container.

- Repeat the following procedure until there is no air left emerging from the plastic pipe:

- Pump the brake lever until it becomes hard and holds the brakes down.

- Open and close the purge valve quickly while keeping the brake on.

- Release the brake.



## **N.B.**

CHECK THE FLUID LEVEL FREQUENTLY DURING THE BLEEDING OPERATION AND REPLENISH THE RESERVOIR WITH BRAKE FLUID WHEN NECESSARY. IF THE RESERVOIR EMPTIES COMPLETELY OF BRAKE FLUID AT ANY TIME DURING THE BLEEDING PROCEDURE, PERFORM THE BLEEDING PROCEDURE ALL OVER AGAIN FROM THE BEGINNING, SINCE AIR WILL HAVE ENTERED THE PIPE. TAP THE BRAKE PIPE LIGHTLY FROM THE CALIPER TO THE RESERVOIR TO ACHIEVE A MORE COMPLETE BLEEDING.

- Extract the transparent plastic pipe.

## **Fit:**

- Reservoir cap.

- Cap securing screws.

- Tighten the bleed valve and fit the rubber hood.

- Check brake fluid level.

- Once the bleeding process has been carried out, check the efficiency of the brake to see if there is any resistance or any fluid loss.

## **WARNING**

WHEN WORKING WITH THE DISK BRAKE, TAKE THE FOLLOWING PRECAUTIONS:

- 1) NEVER RE-USE BRAKE FLUID.

- 2) DO NOT USE FLUID FROM A CONTAINER THAT HAS BEEN LEFT OPEN OR HAS BEEN LEFT UNUSED FOR A PROLONGED PERIOD OF TIME.

# FRONT WHEEL AND BRAKE

3) DO NOT MIX TWO TYPES OR BRANDS OF FLUID FOR USE IN THE BRAKE. THIS LOWERS THE BRAKE FLUID EVAPORATION POINT AND MAY RESULT IN THE BRAKES NOT WORKING EFFICIENTLY. IN ADDITION, IT MAY CAUSE DETERIORATION OF THE BRAKE PARTS.

4) DO NOT LEAVE THE RESERVOIR CAP OFF AT ANY TIME, TO PREVENT CONTAMINATION OF THE FLUID.

5) DO NOT CHANGE THE FLUID IN RAINY OR VERY WINDY CONDITIONS.

6) EXCEPT ON THE BRAKE LININGS AND THE DISK, USE ONLY BRAKE FLUID, ISOPROPILIC ALCOHOL OR ETHYL ALCOHOL FOR CLEANING BRAKE PARTS. DO NOT USE ANY OTHER TYPE OF LIQUID FOR CLEANING THESE PARTS.

PETROL, ENGINE OIL OR ANY OTHER PETROLEUM DISTILLATE WILL CAUSE RUBBER PARTS TO DETERIORATE. IF OIL IS SPILT ON ANY PART, IT WILL BE DIFFICULT TO CLEAN COMPLETELY AND MAY DETERIORATE THE RUBBER USED IN THE DISK BRAKE.

7) ON HANDLING THE DISK BRAKE LININGS OR THE DISK, TAKE CARE TO ENSURE THAT NO BRAKE FLUID COMES INTO CONTACT WITH THEM. CLEAN ANY REMAINS OF BRAKE FLUID THAT ACCIDENTALLY COMES INTO CONTACT WITH THE LININGS OR WITH THE DISK WITH A SOLVENT WITH A HIGH INFLAMMATION POINT. DO NOT USE ONE THAT LEAVES GREASY RESIDUES. IF LININGS CANNOT BE CLEANED SATISFACTORILY, CHANGE THEM FOR NEW ONES.

8) BRAKE FLUID DESTROYS PAINTED SURFACES RAPIDLY. CLEAN OFF ANY SPILT REMAINS IMMEDIATELY.

9) IF ANY OF THE BRAKE SYSTEM PIPE SECURING SYSTEMS OR THE BLEED VALVE OPENS AT ANY TIME, THE AIR CAN BE BLED FROM THE BRAKE SYSTEM PIPE.

## ASSEMBLING THE FRONT WHEEL

1. Fit:

- Speedometer assembly



# FRONT WHEEL AND BRAKE

## **ASSEMBLING THE FRONT WHEEL**

---

Reverse the "**DISMANTLING**" procedures. Take care

with the following points:

### **1. Lubricate:**

- Front wheel axle.
- Bearing.
- Retaining rings.

### **Recommended lubricant:**

Lithium soap based grease

### **2. Fit:**

- Front wheel

### **3. Tighten:**

- Front wheel axle.
- Axle nut (front wheel).

### **ATTENTION**

BEFORE TIGHTENING THE WHEEL AXLE, PUSH THE FRONT FORKS DOWN SEVERAL TIMES, HOLDING THE HANDLEBARS, TO CHECK THEIR OPERATION.

### **Axle nut:**

70-80 N.m (7-8 kgf.m)

### **WARNING**

ENSURE THAT THE SPEEDOMETER CABLE GUIDE IS CORRECT.

### **4. Check:**

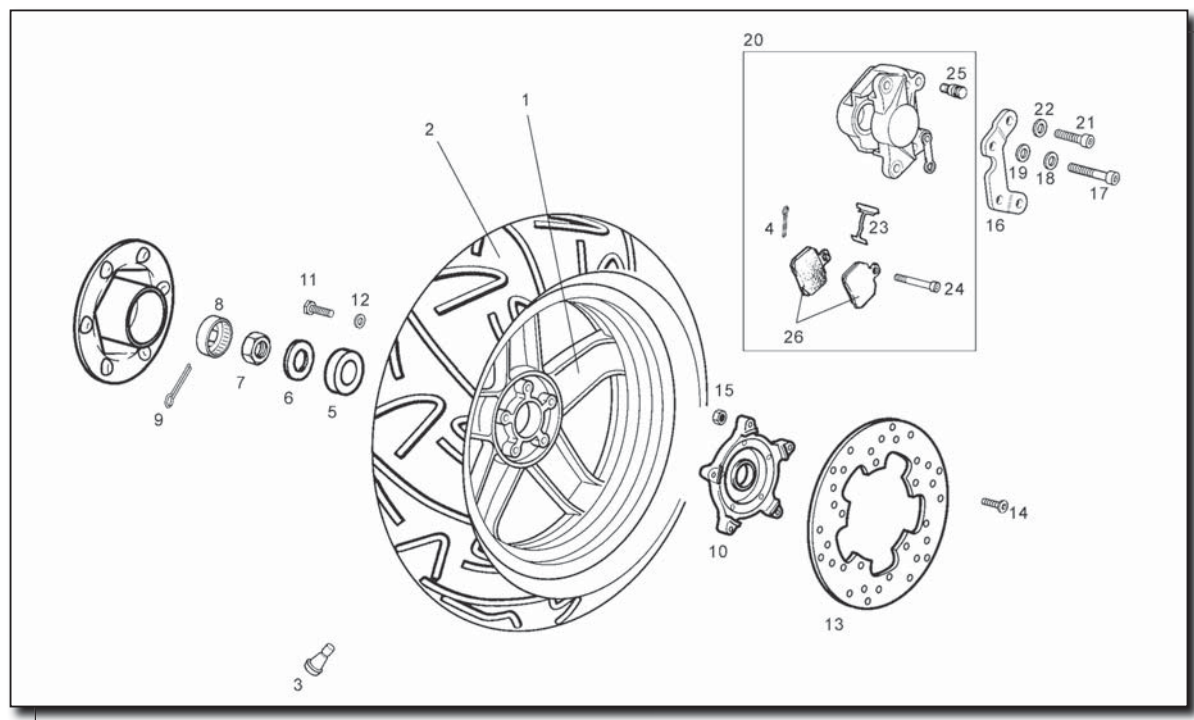
Front brake functioning

Irregular functioning => **Dismantle or check again.**

- Brake lever play

# REAR WHEEL AND BRAKES

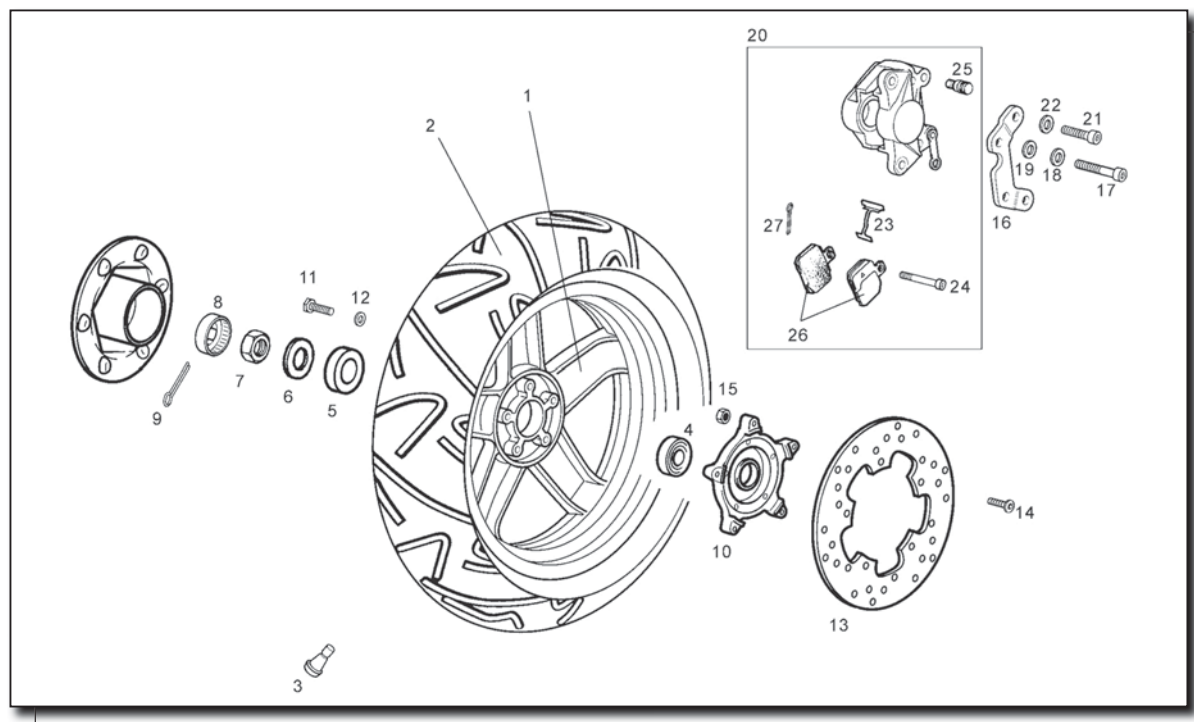
## REAR WHEEL 125 C.C.



1	Rear rim
2	Tyre
3	Valve, tyre
4	Pin
5	Bush
6	Bush
7	Nut
8	Nut
9	Pin
10	Brake disc bracket
11	Screw
12	Washer
13	Rear brake disc
14	Screw
15	Nut
16	Bracket
17	Screw
18	Washer
19	Washer
20	Rear clip assembly
21	Screw
22	Washer
23	Spring
24	Screw
25	Bleed
26	Set of brake pads

# REAR WHEEL AND BRAKES

## REAR WHEEL 250 C.C.



1	Rear rim
2	Tyre
3	Valve, tyre
4	Pin
5	Bush
6	Bush
7	Nut
8	Nut
9	Pin
10	Brake disc bracket
11	Screw
12	Washer
13	Rear brake disc
14	Screw
15	Nut
16	Bracket
17	Screw
18	Washer
19	Washer
20	Rear clip assembly
21	Screw
22	Washer
23	Spring
24	Screw
25	Bleed
26	Set of brake pads
27	Pin

# REAR WHEEL AND BRAKES

## **DISMANTLING**

### **WARNING**

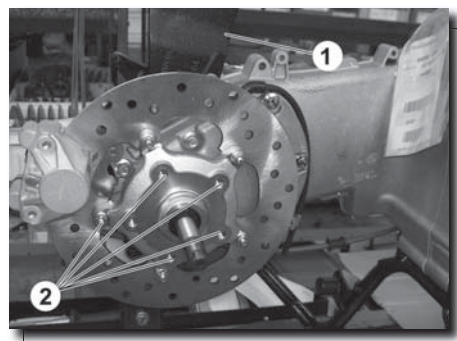
- ENSURE THAT THE MOTORCYCLE IS SUPPORTED FIRMLY AND THERE IS NO RISK OF IT FALLING.
- PLACE THE MOTORCYCLE ON A FLAT SURFACE.

- Place the machine on the centre stand so that the rear wheel is slightly raised.
- Remove the exhaust pipe.
- Remove the right-hand swinging arm support.
- Remove the shock absorber right-hand support bracket.

N.B.

KEEP THE LEFT-HAND ONE IN POSITION TO PREVENT THE ENGINE FROM FALLING FROM THE CHASSIS (1).

- Remove the 5 wheel-secondary transmission output axle securing devices.
- Remove the rear wheel.

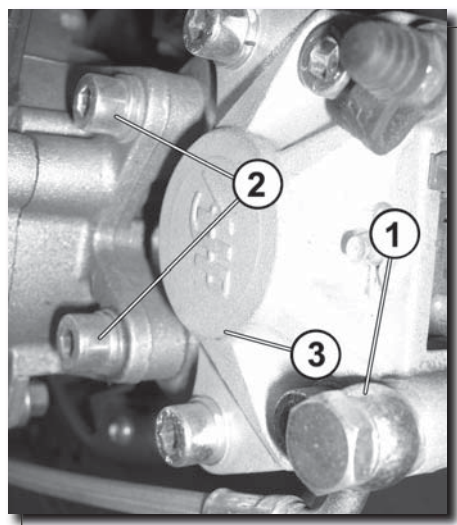


## **DISMANTLING THE REAR DISK CALLIPER**

- Loosen the bolt at the bottom end of the flexible brake hose and tighten it slightly (1)
- Unscrew the Allen bolts securing the calliper to the support plate. (2)
- Remove the brake calliper (3).

### **PRECAUTION**

CLEAN OFF ANY SPILT BRAKE FLUID REMAINS IMMEDIATELY.



# REAR WHEEL AND BRAKES

## **Fitting the rear calliper**

- Fit the bottom end of the flexible brake pipe and the calliper.
- Tighten the brake banjo bolt.
- Check brake fluid level.
- Bleed the braking system pipe (consult "Bleeding the brake system pipe", in the chapter corresponding to the front brakes).
- Check the condition of the braking force to see if any resistance is noted or any loss of fluid.

## **WARNING**

DO NOT ATTEMPT TO RIDE THE MOTORCYCLE UNTIL THE BRAKE LEVER IS OPERATING PROPERLY. PUMP THE LEVER UNTIL THE PADS ARE AGAINST THE DISK. IF NOT, THE BRAKES WILL NOT WORK THE FIRST TIME THE LEVER IS USED.

## **Extracting the rear brake pads**

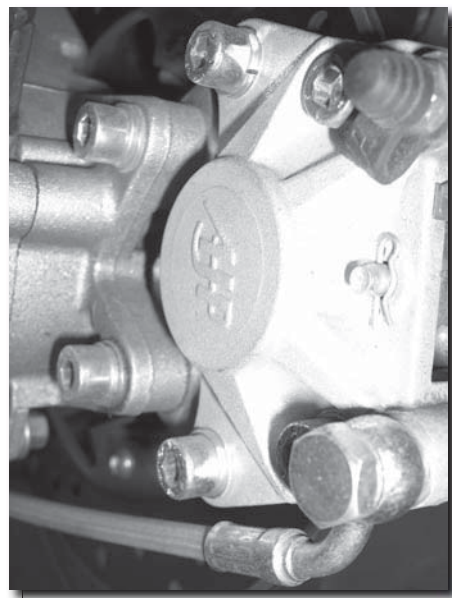
- Remove the rear brake calliper (see "Dismantling the rear brake calliper", in this chapter).

## **Extract:**

- Pad springs (1).
- Brake pads.

## **Fitting the rear brake pads.**

- Press the calliper pistons in manually.
- Fit the pads inside the calliper.
- Adjust the pad springs.



## REAR WHEEL AND BRAKES

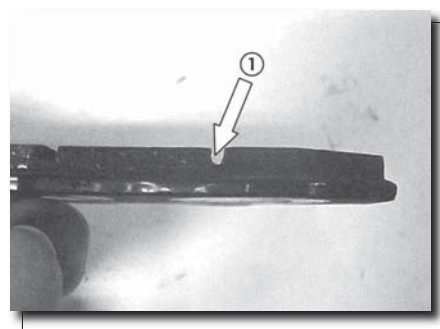
### **WARNING**

DO NOT ATTEMPT TO RIDE THE MOTORCYCLE UNTIL THE BRAKE PEDAL IS OPERATING FULLY. PUMP THE LEVER UNTIL THE PADS ARE AGAINST THE DISK. IF NOT, THE BRAKE WILL NOT WORK THE FIRST TIME THE PEDAL IS USED.

### **Inspecting the pads for wear**

- Removing the rear brake pads.
- Examine both brake pads.

If the wear has caused the wear indicating groove (1) to disappear, both pads must be renewed.



### **Extracting the rear main cylinder**

- Remove the cover protecting the main cylinder. (The bolts securing the cover also support the cylinder)
- Extract the bolt and remove the flexible hose from the brake cylinder reservoir.

### **PRECAUTION**

CLEAN OFF ANY SPILT BRAKE FLUID REMAINS IMMEDIATELY.

### **Fitting the rear main cylinder.**

- Fit the rear main cylinder and its protective cover.
- Tighten the brake flexible hose bolt.
- Bleed the brake system pipe (consult "Bleeding the brake system pipe" in this chapter).
- Check the condition of the braking force to see if any resistance is noted or any loss of fluid.

# REAR WHEEL AND BRAKES

## **Checking the rear main cylinder (visual check)**

- Extract the main cylinder (consult "Extracting the rear main cylinder" in this section).

- Dismantle the rear main cylinder.

- Check that there are no scratches, corrosion or holes in the inner walls of the main cylinder and on the outer part of each piston.

## **If any damage is discovered on the master cylinder or on the pistons, change them.**

- Examine the primary and secondary seals.

- If a seal is worn, soft (perished) or swollen, change the piston assembly to renew the seals.

- If you notice loss of fluid in the brake cylinder, change the seals.

## **Checking the rear calliper main cylinder**

- Check that the anti-dust boots are not damaged.  
If they are, change them.

- Check that the piston return is not damaged. If it is, renew it.

- Check that the relief port and feed port are not blocked.  
if the relief port is blocked, the brake pads will bind on the disk. Inject compressed air to clean the ports.

## **Extracting the brake disk**

- Extract the rear wheel.

- Unscrew the mounting bolts and extract the disk.

## **Fitting the brake disk**

- Fit the brake disk to the rear wheel in such a way that the engraved side faces outwards.

- Apply a temporary blocking device to the threads of the brake disk mounting bolts.

- Tighten the rear brake disk securing bolts.

## **Nominal tightening torque:**

1.0 ÷ 1.2 m·kg (10 ÷ 12 N.m)



## REAR WHEEL AND BRAKES

### Brake disk wear

- Measure the thickness of the disks (A) at the point where they are most worn.

- If the disk is more worn than specified in the service limit, renew it.

Measurement area (B).

#### Standard brake disk thickness:

3.8 ÷ 4.2 mm.

#### Service limit:

3.6 mm.

### Brake disk distortion

- Raise the motorcycle on the jack so that the tyre is clear of the ground.

- Place a dial calibrator against the disk (A) as shown, and measure the disk's deviation from centre as the tyre is turned (B) by hand.

- If the deviation from centre exceeds the service limit, renew the disk.

### Disk deviation from centre:

#### Standard:

Inferior a 0,15 mm

#### Service limit:

0,3 mm

### Bleeding the brake system pipe

The brake fluid has a very low compression coefficient, with the result that almost all the movements of the brake lever are transmitted directly to the calliper for braking. Air however compresses easily. When air enters the brake system pipes, the movement of the brake lever is partially used up in compressing the air. This causes the pedal to feel spongy and leads to a loss of braking power.

### WARNING

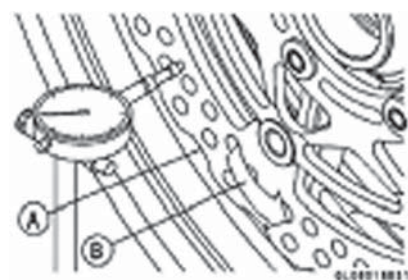
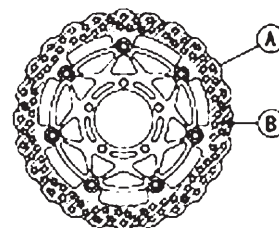
BE SURE TO BLEED AIR OUT OF THE BRAKE SYSTEM WHEN THE BRAKE LEVER FEELS SPONGY AFTER CHANGING THE BRAKE FLUID OR WHEN THE BRAKE SYSTEM PIPE HAS BEEN LOOSENED FOR ANY REASON.

#### Extract:

Reservoir cap (threaded)

- Fill the reservoir with new brake fluid up to the reservoir's top level line.

- With the cap removed, pump the brake pedal several times under no bubbles are seen rising through the fluid.



# REAR WHEEL AND BRAKES

## **Extract:**

- Bolts (1).
- Reservoir cap (2).

- Fill the reservoir with brake fluid up to the top reservoir line.

- With the cap removed, pump the brake lever slowly several times until no bubbles can be seen rising through the liquid.

Purge the air completely from the master cylinder using this procedure.

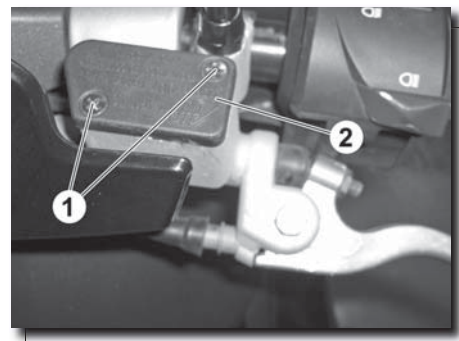
- Remove the transparent plastic cap from the bleed nipple and place the other end of the pipe in a container.

- Repeat the following procedure until there is no air left emerging from the plastic pipe:

- Pump the brake lever until it becomes hard and holds the brakes down.

- Open and close the purge valve quickly while keeping the brake on.

- Release the brake.



## **NOTA**

CHECK THE FLUID LEVEL FREQUENTLY DURING THE BLEEDING OPERATION AND REPLENISH THE RESERVOIR WITH BRAKE FLUID WHEN NECESSARY. IF THE RESERVOIR EMPTIES COMPLETELY OF BRAKE FLUID AT ANY TIME DURING BLEEDING PROCEDURE, PERFORM THE BLEEDING PROCEDURE ALL OVER AGAIN FROM THE BEGINNING, SINCE AIR WILL HAVE ENTERED THE PIPE. TAP THE BRAKE PIPE LIGHTLY FROM THE CALLIPER TO THE RESERVOIR TO ACHIEVE A MORE COMPLETE BLEEDING.

- Extract the transparent plastic pipe.

## **Fit:**

- Reservoir cap.

- Cap securing screws.

- Tighten the bleed valve and fit the rubber hood.

- Check brake fluid level.

- Once the bleeding process has been carried out, check the efficiency of the brake to see if there is any resistance or any fluid loss.



# REAR WHEEL AND BRAKES

## **WARNING**

WHEN WORKING WITH THE DISK BRAKE, TAKE THE FOLLOWING PRECAUTIONS:

- 1) NEVER RE-USE BRAKE FLUID.
- 2) DO NOT USE FLUID FROM A CONTAINER THAT HAS BEEN LEFT OPEN OR HAS BEEN LEFT UNUSED FOR A PROLONGED PERIOD OF TIME.
- 3) DO NOT MIX TWO TYPES OR BRANDS OF FLUID FOR USE IN THE BRAKE. THIS REDUCES THE BRAKE FLUID EVAPORATING POINT AND MAY RESULT IN THE BRAKES NOT WORKING EFFICIENTLY. IN ADDITION, IT MAY CAUSE DETERIORATION OF THE BRAKE PARTS.
- 4) DO NOT LEAVE THE RESERVOIR CAP OFF AT ANY TIME, TO PREVENT CONTAMINATION OF THE FLUID.
- 5) DO NOT CHANGE THE FLUID IN RAINY OR VERY WINDY CONDITIONS.
- 6) EXCEPT ON THE BRAKE LININGS AND THE DISK, USE ONLY BRAKE FLUID, ISOPROPILIC ALCOHOL OR ETHYL ALCOHOL FOR CLEANING BRAKE PARTS. DO NOT USE ANY OTHER TYPE OF LIQUID FOR CLEANING THESE PARTS. PETROL, ENGINE OIL OR ANY OTHER PETROLEUM DISTILLATE WILL CAUSE RUBBER PARTS TO DETERIORATE. IF OIL IS SPILT ON ANY PART, IT WILL BE DIFFICULT TO CLEAN COMPLETELY AND MAY DETERIORATE THE RUBBER USED IN THE DISK BRAKE.
- 7) ON HANDLING THE DISK BRAKE LININGS OR THE DISK, TAKE CARE TO ENSURE THAT NO BRAKE FLUID COMES INTO CONTACT WITH THEM. CLEAN ANY REMAINS OF BRAKE FLUID THAT ACCIDENTALLY COMES INTO CONTACT WITH THE LININGS OR WITH THE DISK WITH A SOLVENT WITH A HIGH INFLAMMATION POINT. DO NOT USE ONE THAT LEAVES GREASY RESIDUES. IF LININGS CANNOT BE CLEANED SATISFACTORILY, CHANGE THEM FOR NEW ONES.
- 8) BRAKE FLUID DESTROYS PAINTED SURFACES RAPIDLY. CLEAN OFF ANY SPILT REMAINS IMMEDIATELY.
- 9) IF ANY OF THE BRAKE SYSTEM PIPE SECURING SYSTEMS OR THE BLEED VALVE OPENS AT ANY TIME, THE AIR CAN BE BLED FROM THE BRAKE SYSTEM PIPE.

# REAR WHEEL AND BRAKES

## **INSPECTING THE REAR WHEEL**

---

### **1. Inspect:**

- Rear wheel axle
- Rear wheel
- Rear wheel bearings
- Retaining rings

See the “**WHEEL AND REAR BRAKE**” section

### **2. Measure:**

- Distortion of the rear wheel

See the “**WHEEL AND REAR BRAKE**” section

## **FITTING THE REAR WHEEL**

---

Reverse the “**DISMANTLING**” procedures.

Take care with the following points:

### **1. Fit:**

- Rear wheel.

### **2. Adjust:**

- Drive chain tension

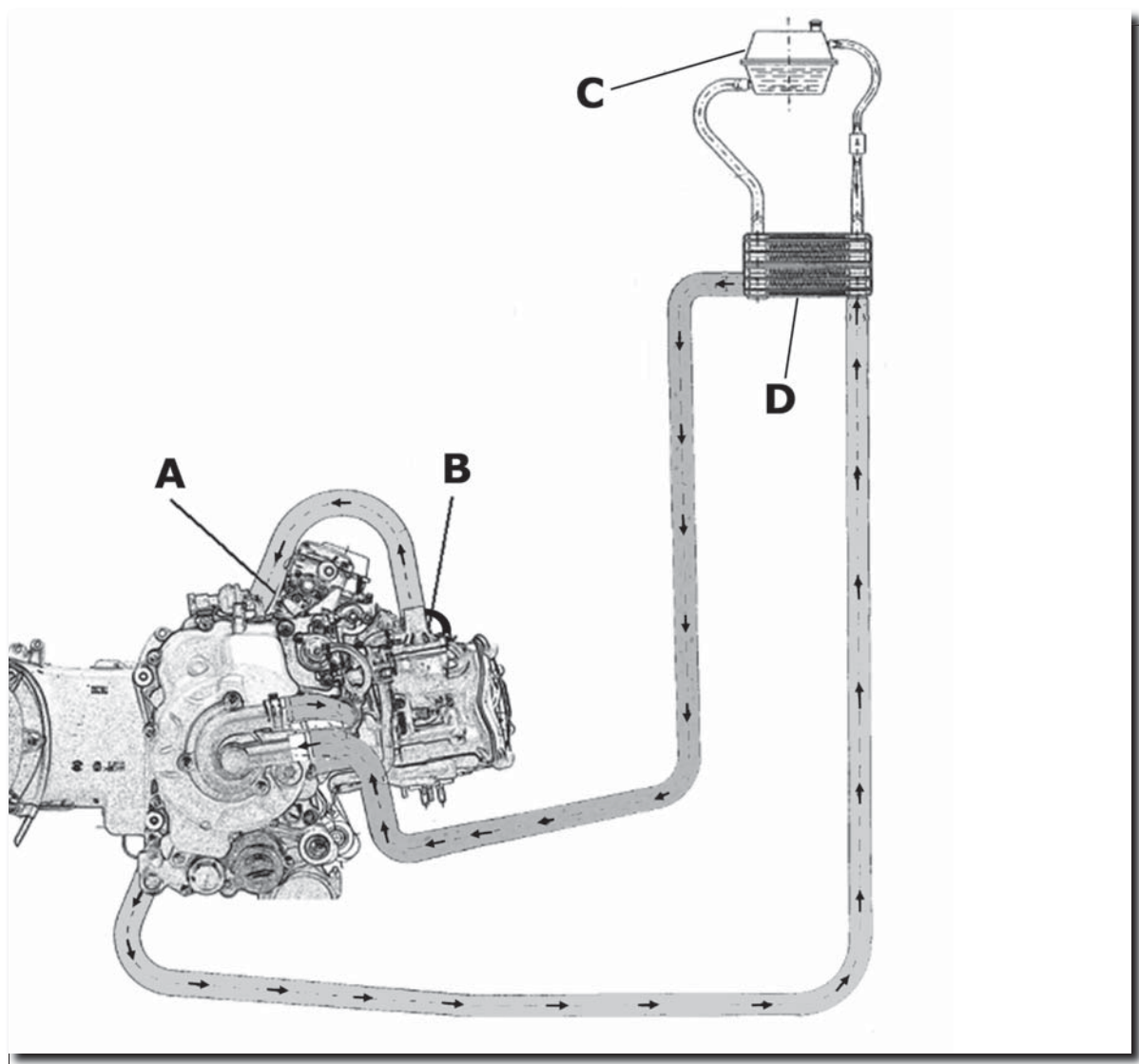
**Nominal tightening torque:**

2,7 ÷ 2,9 m.kg (27 ÷ 28 N.m)

# COOLING SYSTEM

## CIRCUIT DIAGRAM

ENGINE 250



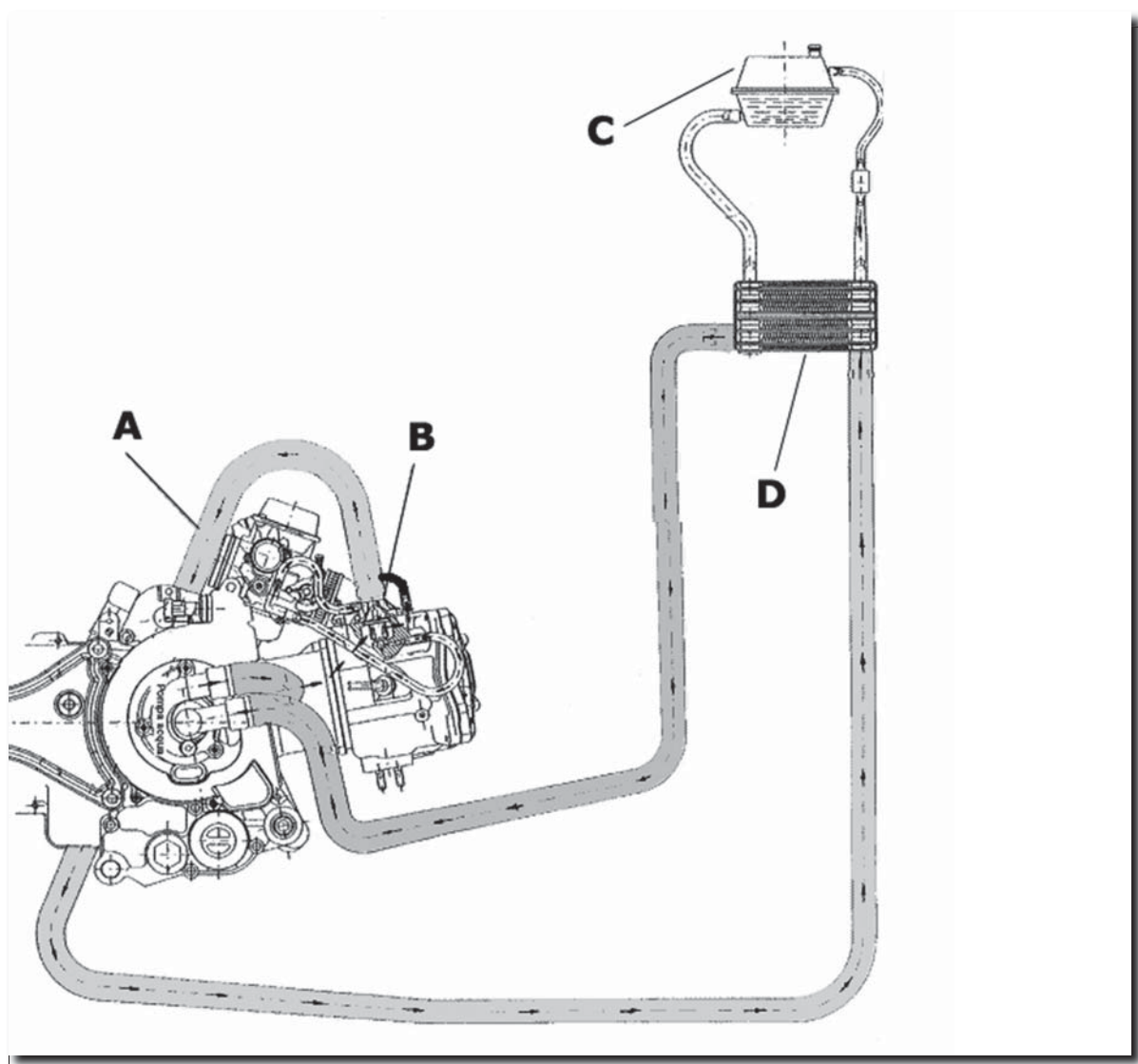
### ENGINE COOLING CIRCUIT

SPECIFICATION	DESC. / QUANTITY
A	Carburettor heating circuit
B	Thermostat with by-pass
C	Expansion tank
D	Radiator

# COOLING SYSTEM

## CIRCUIT DIAGRAM

ENGINE 125



ENGINE COOLING CIRCUIT

SPECIFICATION	DESC. / QUANTITY
A	Carburettor heating circuit
B	Thermostat with by-pass
C	Expansion tank
D	Radiator

# COOLING SYSTEM

## WATER PUMP - OVERHAUL

### ENGINE 125

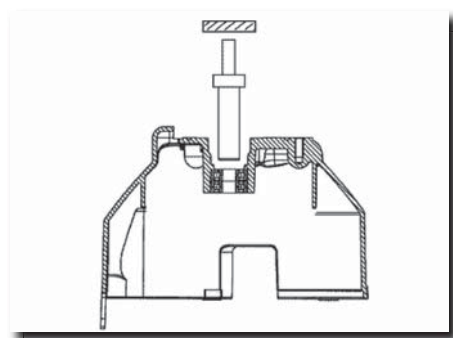
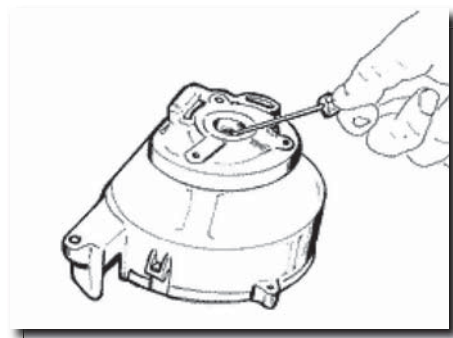
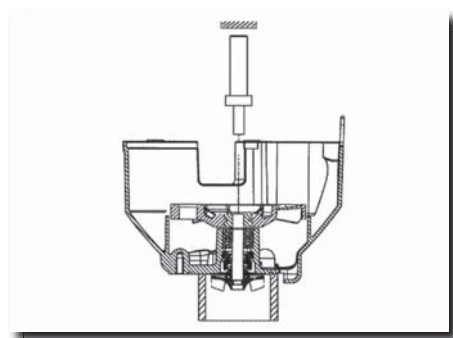
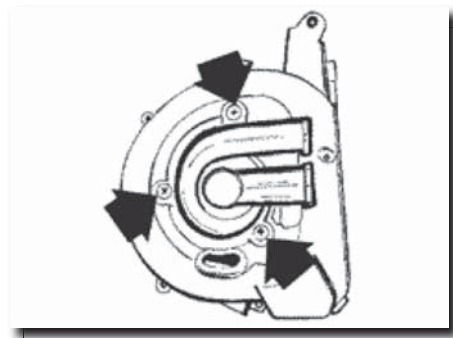
- In case of noise of the bearings or fluid leaks from the inside drainage hole, proceed to the water pump overhaul.
- Remove the flywheel cover with the water pump from the engine (see chapter 4).
- Remove the impeller cover loosening the 3 screws shown in the figure.
- Place the flywheel cover on the ring base of the tool drawing no. 020440Y.
- Using a press and the punch of the specific tool 020440Y, eject the shaft with impeller from the drive and from the bearings.
- Using a screwdriver, remove the static portion of the ceramic seal from the flywheel cover.
- Place the flywheel cover under the press checking that it is perfectly in plane.
- Using the punch in reverse position, eject the two ball bearings.

### N.B.

TO PREVENT DAMAGING THE COVER SURFACE THAT SEALS THE COOLING FLUID, USE THE RING BASE WITH THE MACHINED SURFACE FACING THE FLYWHEEL COVER.

### Components inspection

- Ensure the impeller is not abnormally worn or cracked;
- Ensure the impeller shaft is not corroded;
- Ensure there are no signs of oxidation on the bearing housing and on the ceramic seals;
- Ensure the driven gear is not cracked and perfectly joint to the steel hub.





# COOLING SYSTEM

- Using the thermal gun, heat the flywheel cover from the internal side.
- Place the flywheel cover on the ring base in a way similar to the removal steps.
- Place the pair of bearings on the specific punch.
- Keep the bearings on the specific tool by grease.
- Insert the bearings into the crankcase to travel end, using a plastic mallet.
- Assemble the ceramic ring and the relevant rubber gasket.

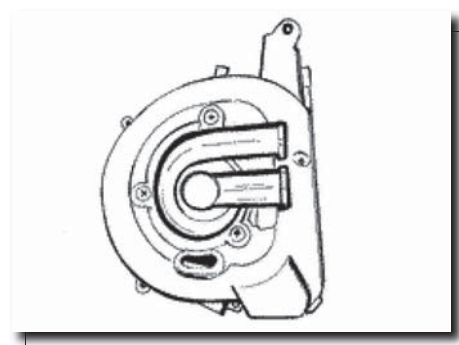
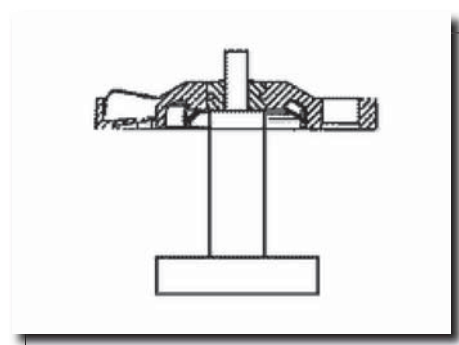
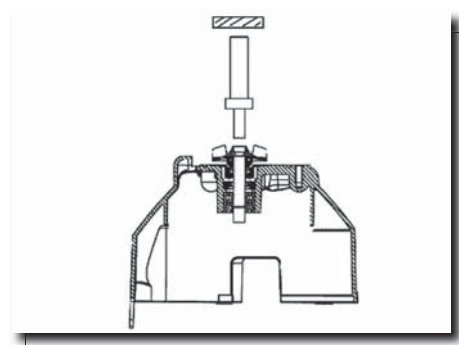
The chamfering of the ceramic ring must face the gasket.

- Lubricate the rubber gasket and insert the unit on the flywheel cover.
- If necessary, manually use the punch of the specific tool.
- Insert the drive on the guiding pin of the support base of the specific tool, with the convex part facing upwards.
- Insert the flywheel cover with the bearings on the specific tool.
- Insert the shaft with mechanical seal on the bearings.
- Using the specific punch and the press, insert the shaft into the bearings and into the drive to the travel end of the specific tool.
- Replace the impeller cover using a new O-Ring.
- Tighten the 3 fixing screws at the torque below:

**N.B.**  
DO NOT HEAT TOO MUCH AS THIS MAY CAUSE ALTERATIONS TO THE PAINTED SURFACE.

**N.B.**  
ALWAYS USE NEW BEARINGS.

**N.B.**  
ALWAYS USE NEW GASKET AND CERAMIC RING. A NON-MANUAL ASSEMBLY OF THE CERAMIC SEALING RING COULD DAMAGE THE SAME.



## COOLING SYSTEM

**N.B.**

PERFECTLY CENTRE THE PUNCH ON THE IMPELLER. MOVE THE SHAFT AND CHECK THAT THE FLYWHEEL COVER TURNS IN PLANE. FAILURE TO OBSERVE THIS REGULATION CAN DAMAGE THE DRIVE.

**N.B.**

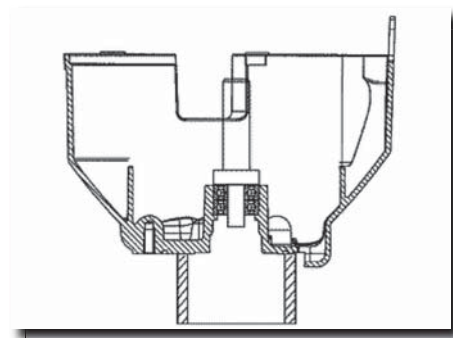
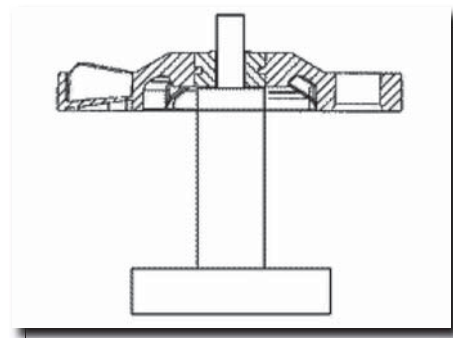
DO NOT LUBRICATE THE O-RING. FAILURE TO OBSERVE THIS RULE CAUSES A DEFORMATION OF THE RING.

**Specific tooling**

020440Y Water pump overhaul tool

**Locking torques (N\*m)**

Water pump impeller cover  $3 \div 4$



**ENGINE 250**

- Remove the complete flywheel cover
- Remove the stator
- Remove the pump cover by loosening the 3 fixing screws
- Remove the sealing gasket



# COOLING SYSTEM

The pump can be serviced using the special tool and a press. The special tool is designed to be used with the presses most commonly found in workshops. For those presses equipped with a 35-mm piston and protective cap with fixing screw, it is sufficient to remove the cap and install the components of the special tool in its place. The special tool can be prepared in advance depending on its use on presses equipped with piston with a threaded type of coaxial coupling tang or cylindrical with stop groove. Then prepare the threaded ring with the adapter suitable for the coupling of the press used.

- Position the flywheel cover in the hydraulic press by inserting the impeller in the ring that is part of the special tool, as shown in the photo

## N.B.

POSITION THE BASE WITH THE SURFACE PROVIDED WITH BETTER FINISH TURNED TOWARDS THE FLYWHEEL COVER. FAILURE TO COMPLY WITH THIS INSTRUCTION MAY RESULT IN DETERIORATION OF THE SURFACE INTENDED FOR THE COOLANT'S SEAL.

## Specific tooling

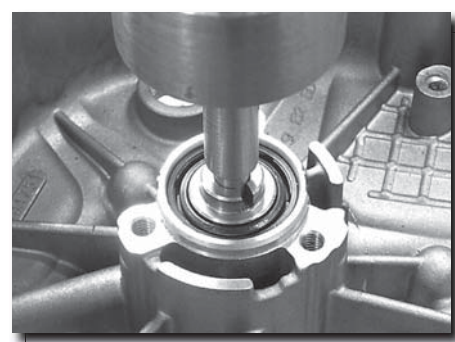
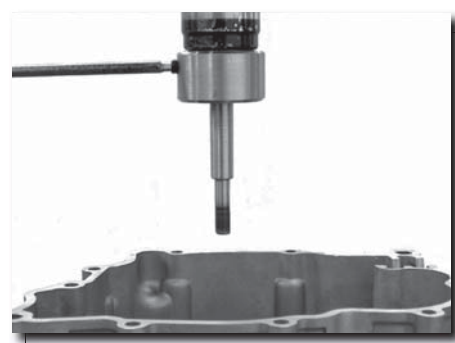
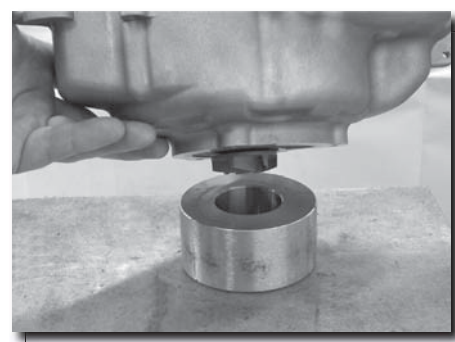
020628Y Water pump overhaul kit - quasar 250

Install the pin that is part of the special tool on the press piston.

Turn the flywheel cover until it permits insertion of the pin inside the joint and eject the pump shaft from the joint and bearings.

## Specific tooling

020628Y Water pump overhaul kit - quasar 250



## COOLING SYSTEM

Remove the ceramic seal from the pump shaft. Using a screwdriver, remove the ceramic ring and sealing gasket from the flywheel cover.

**N.B.**

IN THE EVENT YOU PLAN TO REUSE THE MECHANICAL SEAL, PAY ATTENTION DURING THE DISASSEMBLY STAGES IN ORDER TO NOT CHIP THE CERAMIC RING.

- Remove the joint from the seat inside the seal ring.
- Position the flywheel cover in the press while sustaining it using the surface to be used for coupling with the engine case.

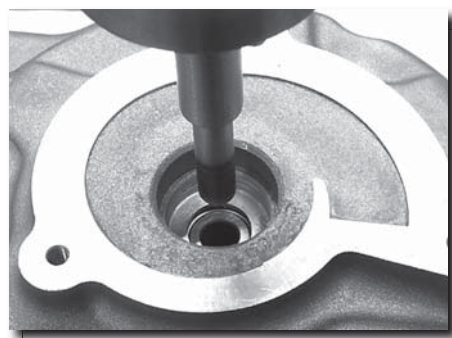
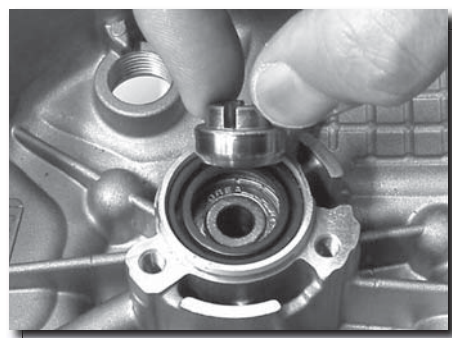
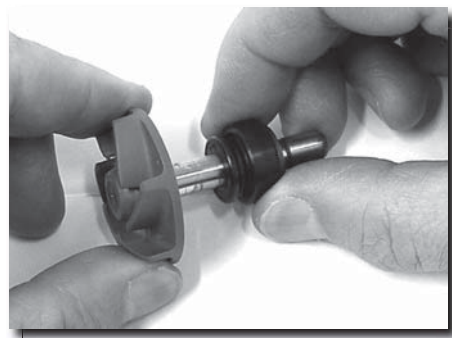
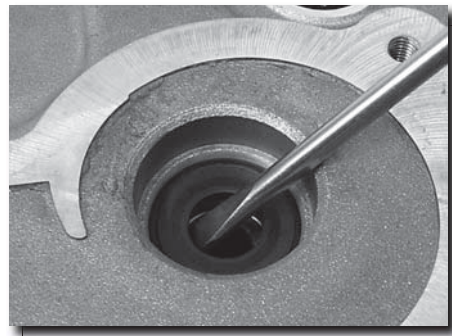
**ATENCIÓN**

CHECK THE POSITIONING OF THE CENTRING DOWELS. PROPERLY PROTECT THE COUPLING SURFACE.

Centre the cover until it permits insertion of the pin and then eject the seal ring and the two ball bearings.

**Specific tooling**

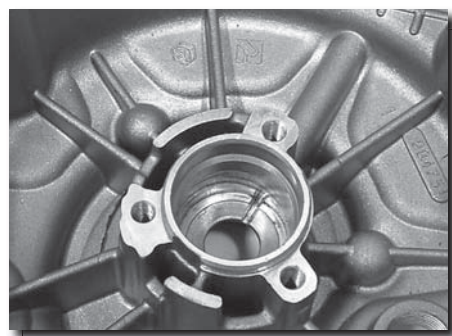
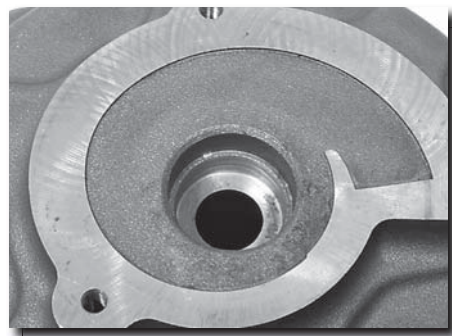
020628Y Water pump overhaul kit - quasar 250



# COOLING SYSTEM

Before you reassemble, wash all the components and continue with the following checks.

**Flywheel cover:** Check that there are no cracks or oxidation on the seat of the ceramic seal. Check the capacity loads of the bearings and of the seal ring. Check the efficiency of the drain hole.



**Shaft:** Check to be sure there is no oxidation. Check that the impeller is in perfect condition. **Ceramic seal:** Check that the ceramic seals are not worn, cracked or scored. Check that the two rubber seals are in perfect condition. Check the thrust spring.

**Bearings:** Check that they do not have irregular plays or are noisy.



**Entrainment joint:** Check that there is no abnormal wear on the seat for the oil seal seat and on the slots for the entrainment spring.





## COOLING SYSTEM

Heat the flywheel cover using the heat gun

**N.B.**  
IF THE JOB IS PERFORMED WITH THE STATOR MOUNTED,  
HEAT FROM THE EXTERNAL SIDE OF THE COVER.

**Specific tooling**

020151Y Air heater

020150Y Support for air heater

Properly support the cover and using the modular punch,  
install the two bearings all the way down at the same time.

**N.B.**  
WORK IN AN UPRIGHT POSITION

**Utillaje específico**

020376Y Handle for punches

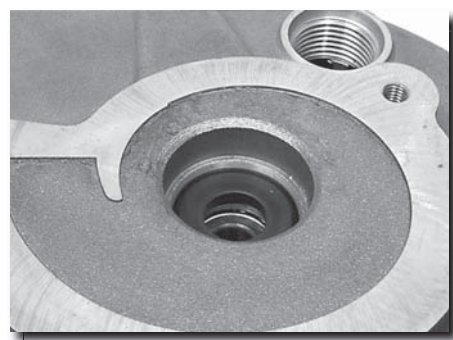
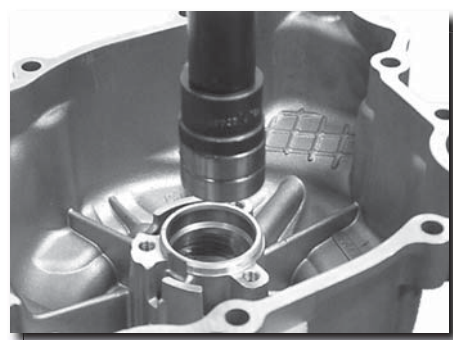
020441y 26 x 28 mm adaptor

020629y 8 mm guide

Let the flywheel cover guard cool down and then manually  
mount the static part of the ceramic seal with the relative  
rubber seal.

**N.B.**  
PAY ATTENTION TO MOUNTING THE CERAMIC RING CO-  
RRECTLY. THE CHAMFER ON THE INTERNAL DIAMETER  
MUST BE TURNED AWAY FROM THE SIDE OF THE BEA-  
RINGS.

Mount the moving part of the ceramic seal on the shaft with  
the impeller. The rubber part must rest against the impeller.

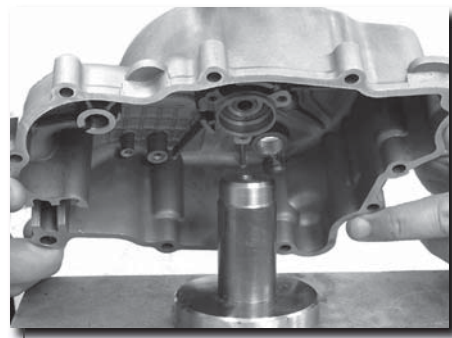


## COOLING SYSTEM

Position the flywheel cover on the press using the support base for the bearings that is part of the special tool. Install the special punch with the impeller's template on the press piston.

### Specific tooling

020628Y Water pump overhaul kit - quasar 250



Manually insert the pump shaft in the relative bearings.



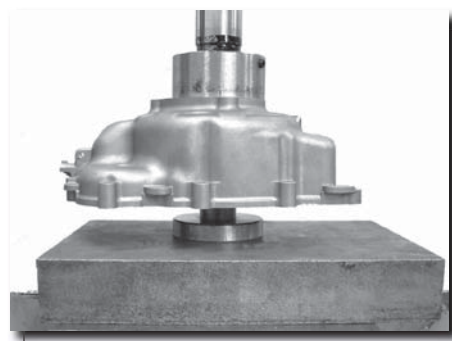
While keeping the bearings in contact with the support base, line up the shaft with the press piston and proceed with the driving. The driving depth is determined by the beat of the punch when it is in contact with the flywheel cover.

### N.B.

SO AS TO NOT DAMAGE THE FLYWHEEL COVER DURING THE DRIVING OPERATION, SLIGHTLY TURN IT BY HAND IN ORDER TO BETTER PERCEIVE THE MOMENT OF CONTACT WITH THE PUNCH.

### Specific tooling

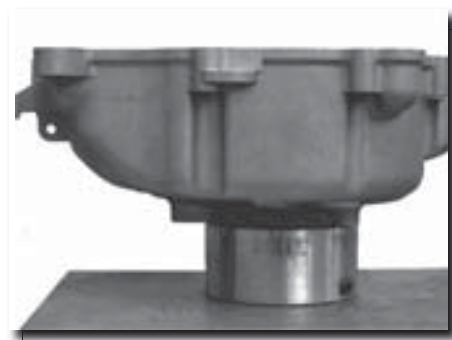
020628Y Water pump overhaul kit - quasar 250





## COOLING SYSTEM

Remove the special punch from the press piston and support the flywheel cover from the impeller side with it.



Put the new oil seal on the special punch while being careful to position the seal lip starting from the side of the handle.



Install the oil seal on the flywheel cover all the way to the depth determined by the punch.

### **Specific tooling**

020628Y Water pump overhaul kit - quasar 250



Fit the punch with the template of the entrainment joint to the press punch.

Position the entrainment joint on the shaft and using the press, drive it to the depth determined by the punch.

### **Specific tooling**

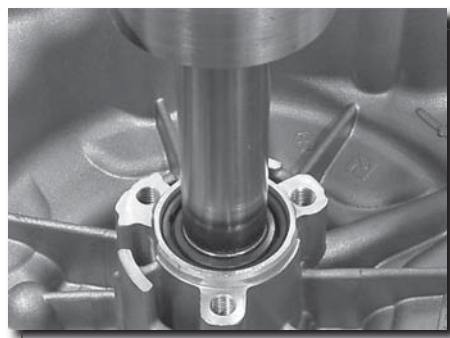
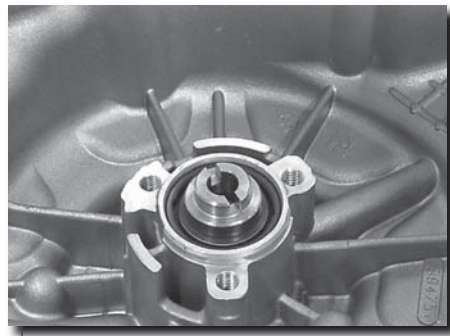
020628Y Water pump overhaul kit - quasar 250



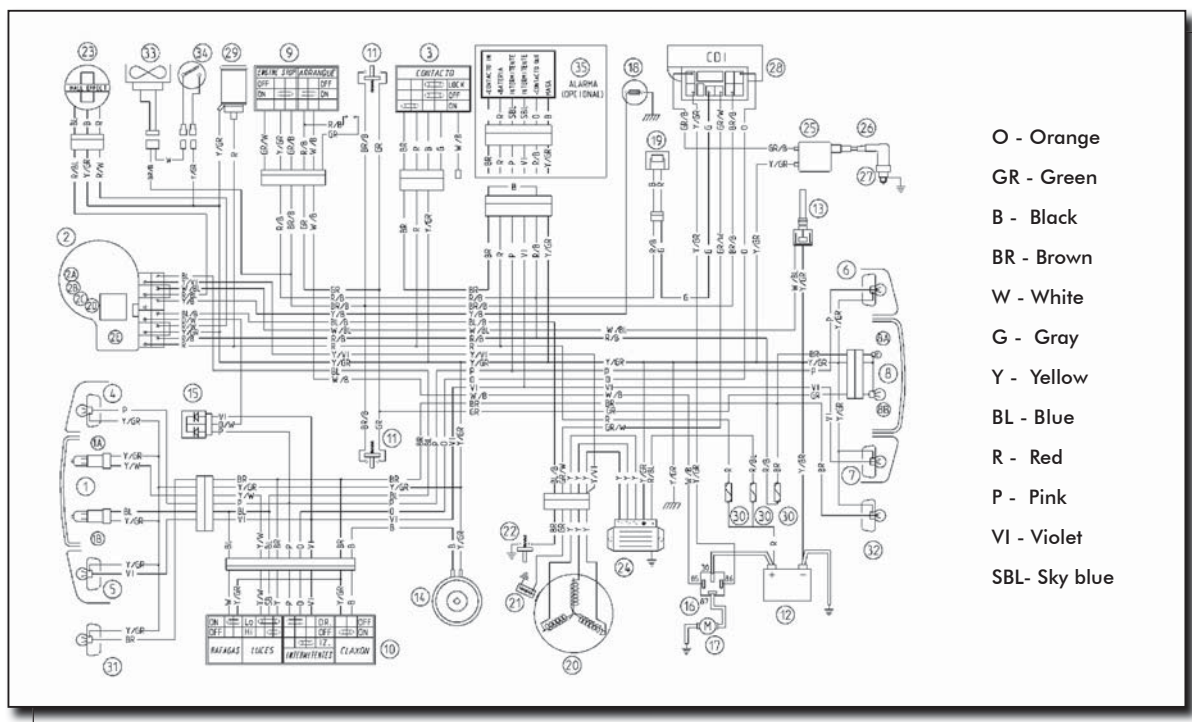
# COOLING SYSTEM

## COOLING SYSTEM

Lubricate the oil seal with motor oil.



## ELECTRICAL SYSTEM GP1 125-250



1	Headlamp assembly
1A	Right headlight 12V 55W/H11
1B	Left high beam headlight 12V 55W/H11
2	Speedometer
2A	Led water temperature indicator
2B	Led oil indicator
2C	Led fuel indicator
2D	Led high beam indicator
2E	Led turn signal indicator
3	Ignition switch
4	Front right turn signal light 12V 10W (Orange)
5	Front left turn signal light 12V 10W (Orange)
6	Rear right turn signal light 12V 10W (Orange)
7	Rear rleft turn signal light 12V 10W (Orange)
8	Headlight pilot
8A	Pilot light 12V 2,3W
8B	Stop light 12V 16W
9	Engine stop A-E switch
10	Lights-turn indicat.-horn and high beam switch
11	Stoplight switch
12	Battery 12V 12Ah
13	Fuel sensor
14	Horn
15	Diode box
16	Starter relay 12V 80Amp

17	Starter motor
18	Temperature thermoresistenace
19	Electric choke
20	Electronic magneto
21	Pick-up
22	Oil lever sensor
23	Unit drive (Hall effect)
24	Regulator 12V AC-DC
25	Electronic converter A.T.
26	Spark plug anti-radio interference
27	Spark plug
28	Electronic ignition device - CDI
29	Mobil phone connector
30	Fuse 15 Amp
31	Position bulb 12V 2,3W
32	Licence plate light 12V 5W
33	Ventilator
34	Thermocontact ventilator
35	Alarm (optional)

# ELECTRICAL SYSTEM

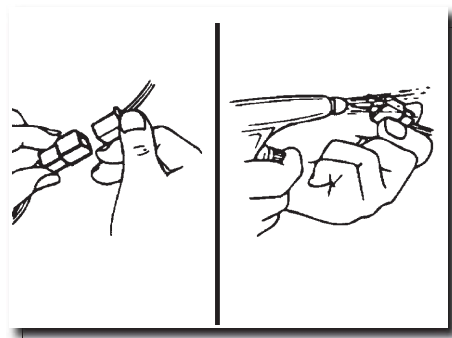
## CHECKING CONNECTORS

Check for corrosion, damp etc. in the connectors.

### 1. Disconnect:

- Connectors

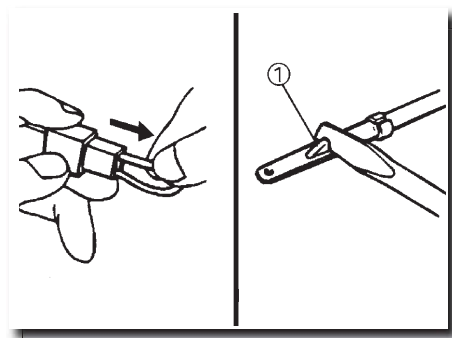
### 2. Dry each of the terminals with compressed air.



### 3. Connect and disconnect two or three times.

### 4. Pull the conductor to check if it is loose.

5. If the terminal comes loose, bend the pin (1) and refit the terminal in the connector.

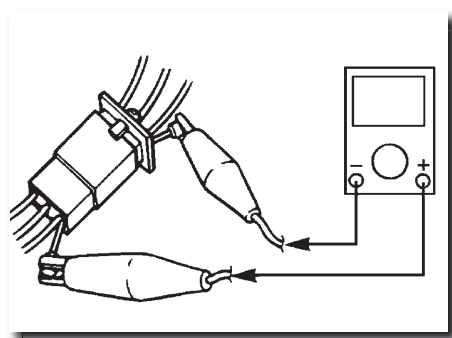


### 6. Connect:

- Connector

### N.B.

THE TWO PARTS OF THE CONNECTOR MAKE A SOUND WHEN THEY FIT TOGETHER.



### 7. Check the circuit with a Multimeter.

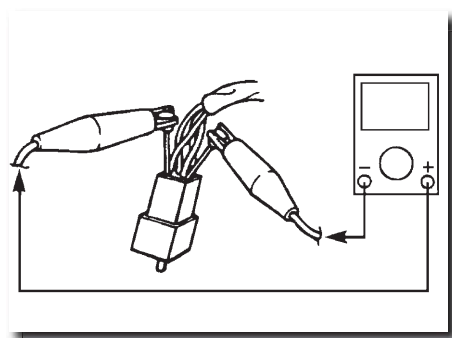
### N.B.

- IF THERE IS NO CIRCUIT, CLEAN THE TERMINALS.

- FOLLOW THE STEPS FROM (1) TO (7) ABOVE ON INSPECTING THE ELECTRICAL SYSTEM.

- AS A PROVISIONAL SOLUTION, USE A CONTACT CLEANER.

- USE THE MULTIMETER IN ACCORDANCE WITH THAT INDICATED IN THE FIGURE.



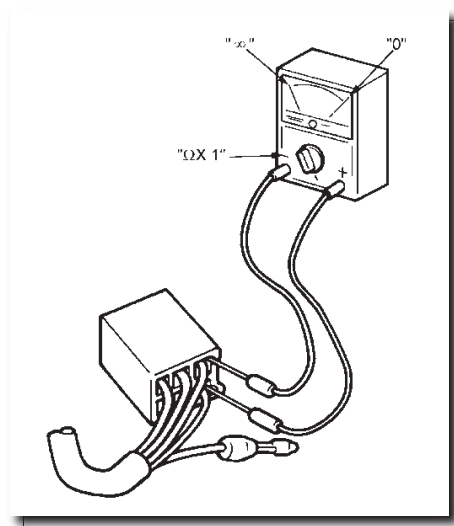
# ELECTRICAL SYSTEM

## INSPECTION STEPS

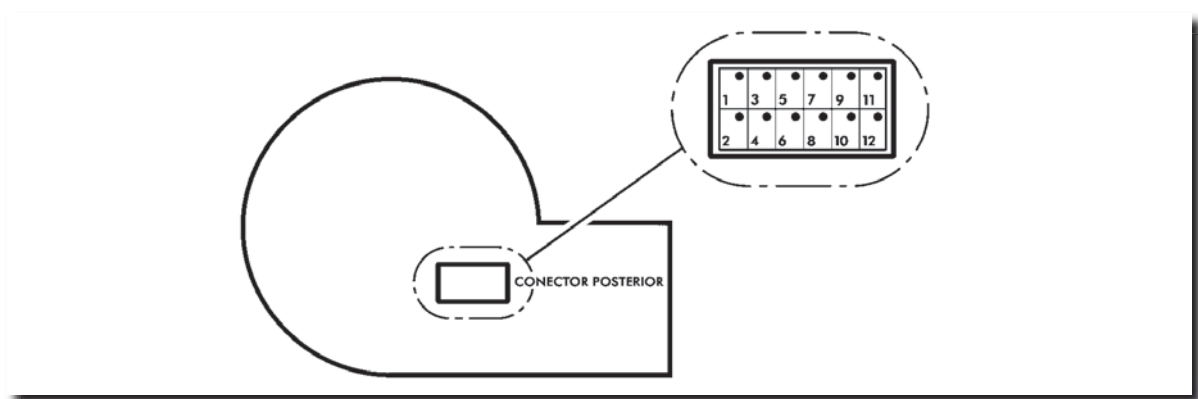
Using a multimeter, check the circuit between the terminals to make sure that they are correctly connected. Replace the component if any of the combinations gives an incorrect reading.

### N.B.

- SWITCH THE "ON" AND "OFF" SWITCH ON AND OFF SEVERAL TIMES.
- ADJUST THE METER SELECTOR TO THE "X1" POSITION.
- ADJUST THE GAUGE TO "ZERO".

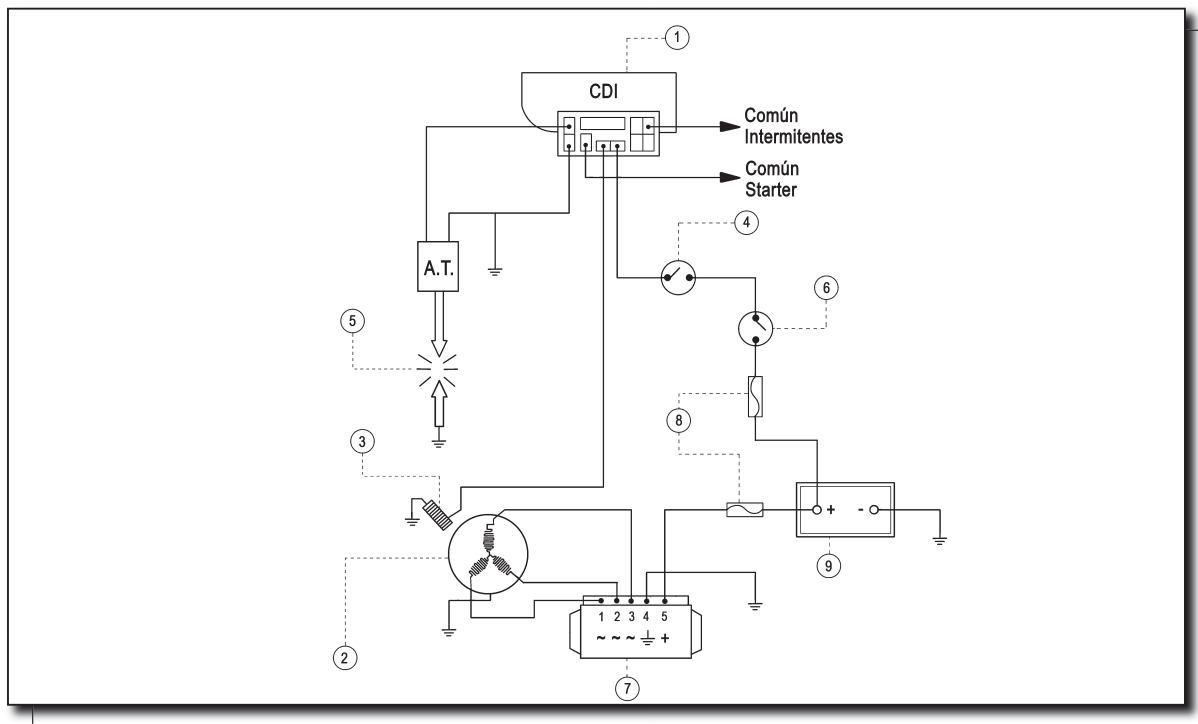


## DIGITAL INSTRUMENTS UNIT



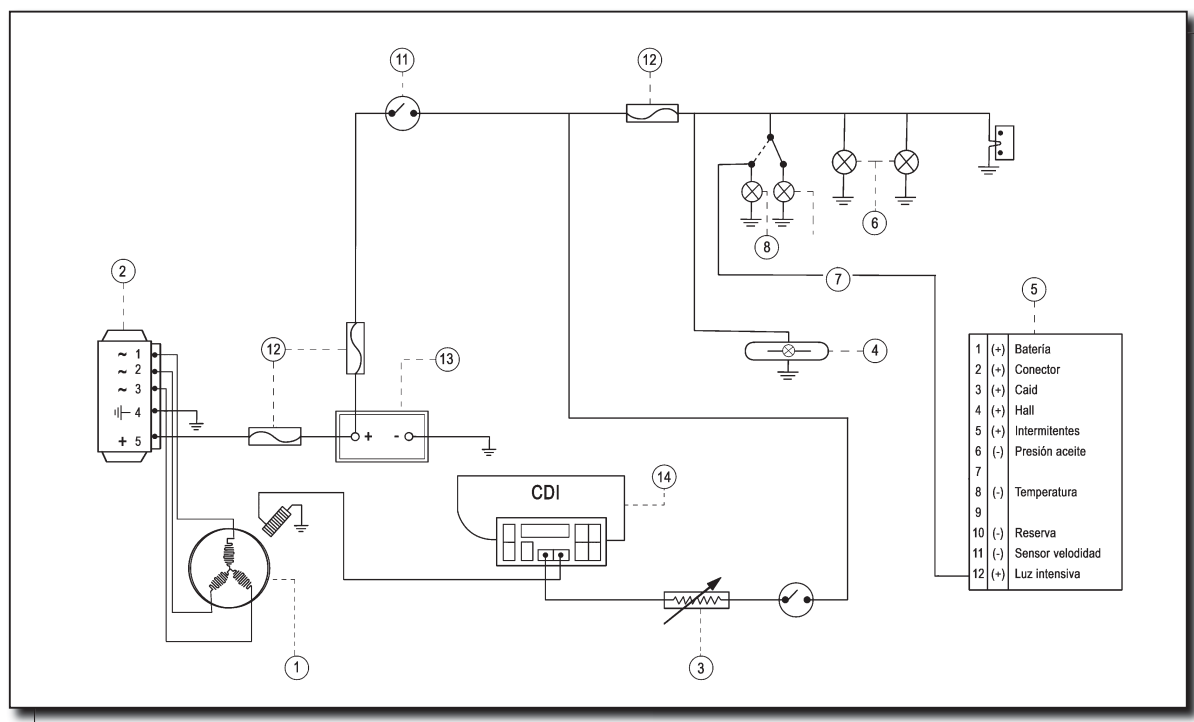
NÚMERO CONEXIÓN	POLARIDAD	DESCRIPCIÓN
1	(+)	Battery
2	(+)	Contact
3	(+)	GND
4	(+)	Hall Effect (without intensity) <b>Check:</b> Battery voltage, at the terminals with a digital
5	(+)	Turn indicator.
6	(-)	Oil indicator.
7		No connection.
8	(-)	Temperature indicator.
9		Hall pulses.
10	(-)	Fuel reserve indicator.
11	(-)	Centre stand indicator.
12	(+)	Main beam indicator.

## IGNITION



1	Voltage regulator.
2	Battery
3	15A fuse
4	CDIU
5	Digital instruments unit
6	Fan
7	Fan thermostat switch
8	Hall sensor
9	Oil pressure sensor
10	Petrol reserve sensor
11	Temperature thermo-resistance
12	Engine stop
13	switch

## LIGHTS AND AUTOMATIC CHOKE

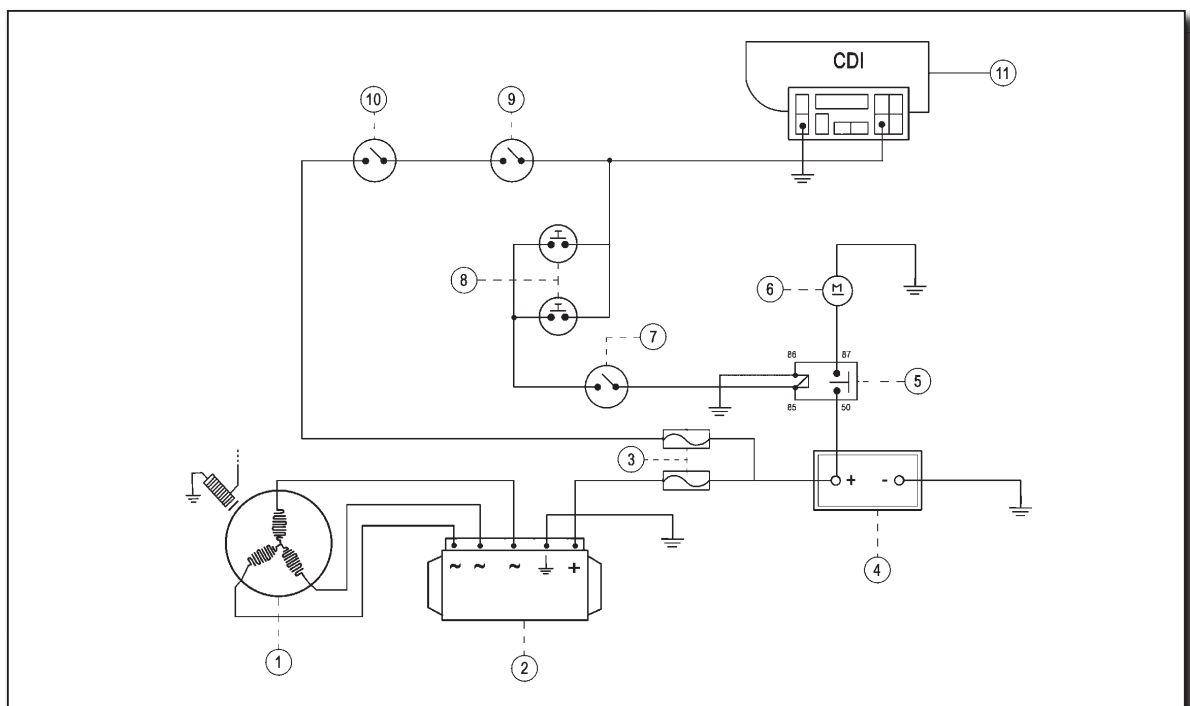


1	Alternator
2	Voltage regulator
3	Automatic choke
4	Rear light
5	Digital instruments unit
6	Front sidelight bulbs
7	Dipped headlight bulbs
8	Main beam headlight bulbs
9	Pick-Up
10	Ignition key switch
11	Light switch
12	15A fuse
13	Battery
14	CDIU



# ELECTRICAL SYSTEM

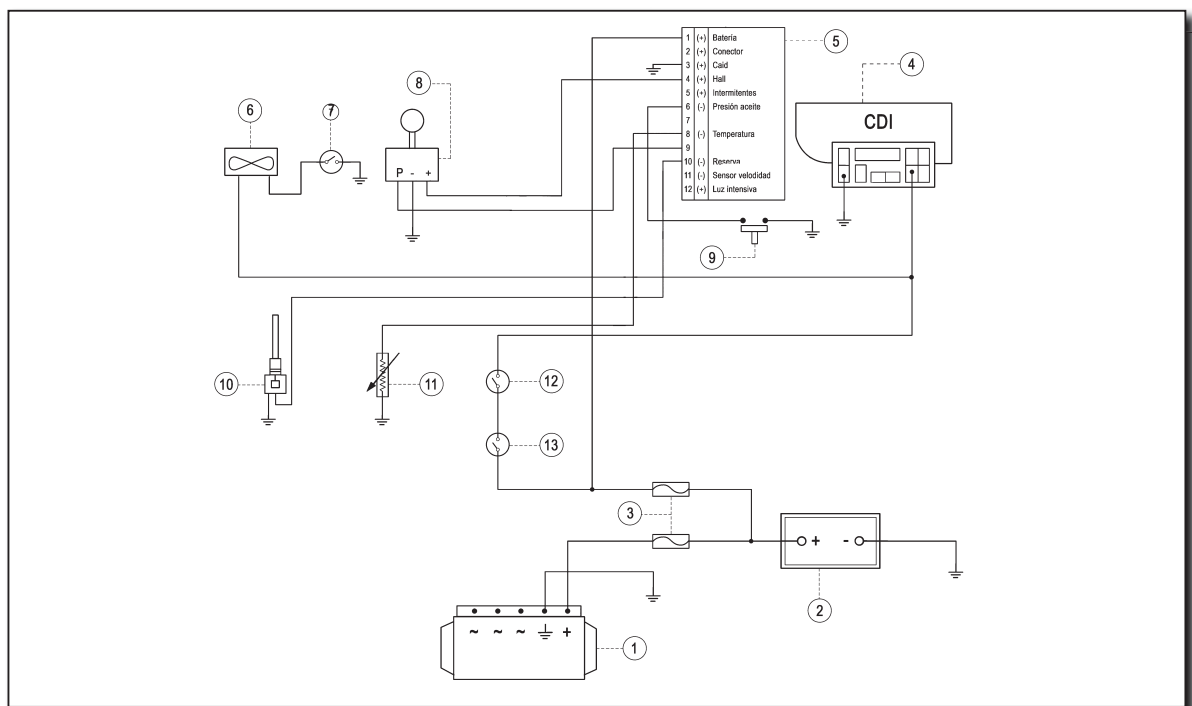
## RECHARGING THE BATTERY AND STARTING



1	Alternator
2	Voltage regulator
3	15A fuse
4	Battery
5	Starter relay
6	Starter motor
7	Starter switch
8	STOP button
9	Engine stop
10	Switch
11	CDIU

# ELECTRICAL SYSTEM

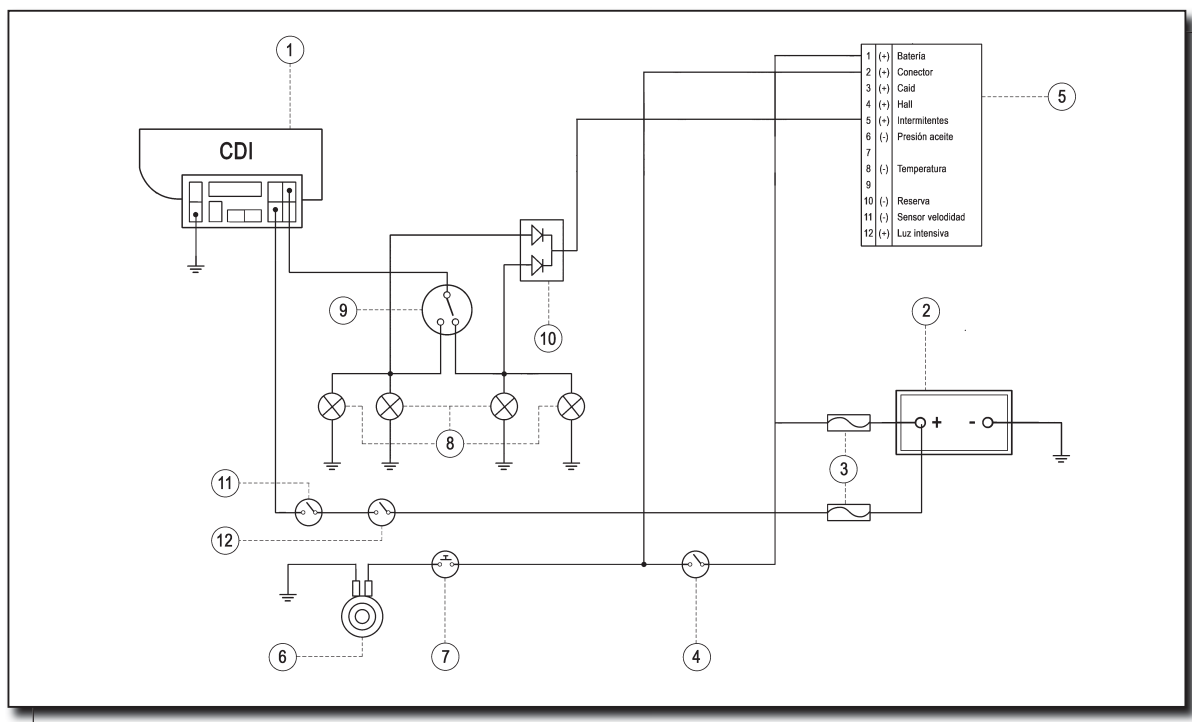
## SENSORS AND INDICATORS



1	Voltage regulator
2	Battery
3	15A fuse
4	CDIU
5	Digital instruments unit
6	Fan
7	Fan thermostat switch
8	Hall sensor
9	Oil pressure sensor
10	Petrol reserve sensor
11	Temperature thermo-resistance
12	Engine stop
13	Switch

# ELECTRICAL SYSTEM

## TURN INDICATORS AND HORN



1	CDIU
2	Battery
3	15A fuse
4	Switch
5	Digital instruments unit
6	Horn
7	Horn button
8	Turn indicator bulbs
9	Turn indicator button
10	Diode box
11	Engine stop
12	Switch

# ELECTRICAL SYSTEM

## IGNITION CIRCUIT

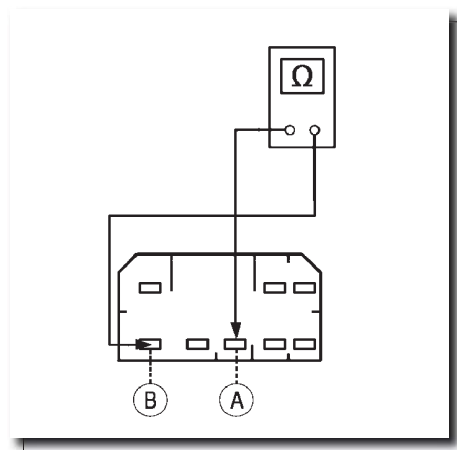
### Ignition system

Once the immobilizer system has been enabled, it is possible to have the spark at the spark plug by the H.V. coil and the signals coming from the Pick-Up.

The basic power supply comes from the battery, the system is calibrated in such a way that any drops of voltage of the battery are perceived by the start up system but are unimportant for the start up system.

The Pick-Up is connected to the control unit by a single wire, thus for the earth circuit the Pick-Up is connected to the control unit by the chassis and the engine earth cable.

To prevent troubles to the start up system during start up, it is very important to have a good efficiency of the engine-chassis earth connection.



## SPARK PLUG

Finding the lack of current to the signaling candle with led ignition possible to proceed like of continuation:

### -Control Pick-Up.

Disconnect the connector from the central unit and check that there is a circuit between terminal A (white/green) and terminal B (yellow/green). The pick-up check is carried out on the pick-up and its power feed line:

### Electric characteristic

#### Resistance value pick-up

$105 \div 124 \text{ ohm}$

If the circuit is interrupted, repeat the check between the flywheel connector and the engine earth (see engine manual). If the measured values are not as specified, replace the pick-up, otherwise repair the wiring.

If, on the other hand, the values are as specified, try replacing the control unit (without programming it) and ensure that the problem has been solved by checking that a spark is produced at the plug.

Then proceed to program the control unit.

### - Checking the HV coil primary circuit

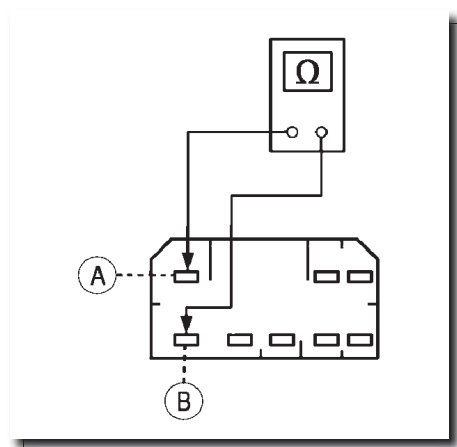
Disconnect the connector from the central unit and check that there is a circuit between terminal A (green/black) and terminal B (yellow/green).

If the resistance is not as specified, repeat the check directly on the positive and negative terminals of the HV coil primary circuit. If the resistance is as specified, proceed to repair the wiring or restore the connections, otherwise replace the HV coil.

### Electric characteristic

#### Resistance value H.V. coil primary check

$0,4 \div 0,5 \text{ ohm}$



# ELECTRICAL SYSTEM

## - H.T. coil secondary circuit check

Disconnect the spark plug cap from the H.T. cable and measure the resistance between the end of the H.T. cable and the negative terminal of the H.T. coil (see figure).

If the measured values are not as specified, replace the H.T. coil. To obtain a more accurate diagnosis proceed to verify the peak voltage using the multimeter adapter.

### Electric characteristic

#### Resistance value

H.T. coil secondary circuit resistance value:  
 $\sim 2000 \pm 300 \text{ ohm}$

#### Pick-up

- Disconnect the connector from the central unit and check that there is a circuit between terminal A (white/green) and terminal B (yellow/green).

- Set the multimeter onto 200V.

- Crank the engine by operating the starter motor and measure the voltage produced by the pick-up.

- If the voltage is not as specified, replace the pick-up.

#### N.B.

THE MULTIMETER MUST BE SET TO MEASURE DIRECT VOLTAGE.

#### Specific tooling

020409Y Multimeter adapter (Peak voltage measurement)

### Electric characteristic

#### Valore tensione

> 5 Volt

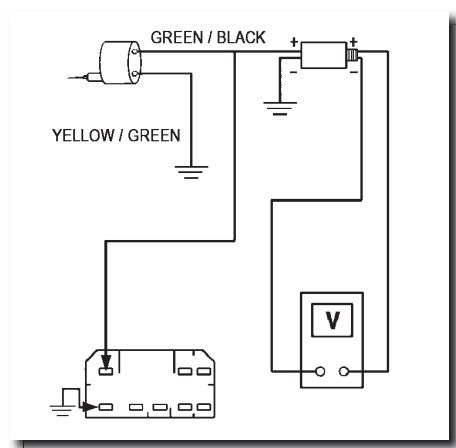
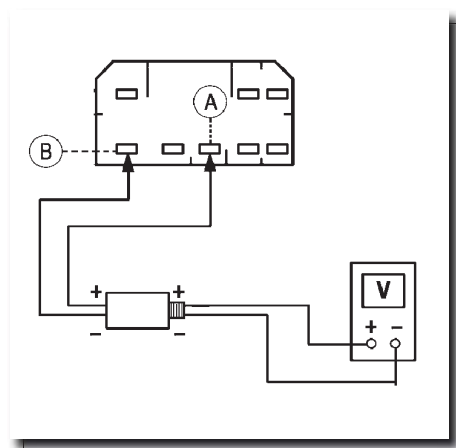
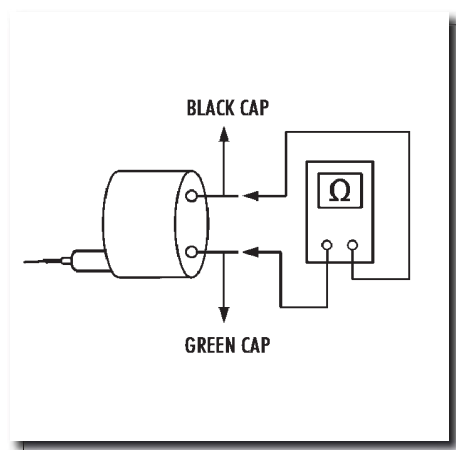
With control unit and H.V. coil normally connected, measure the voltage of the coil primary during the start up test by the adapter for peak voltages inserting the positive terminal to earth and the negative to the positive connector of the coil. In case of non-conforming values, replace the control unit.

#### N.B.

THE PLASTIC CAP OF THE POSITIVE TERMINAL OF THE PRIMARY OF THE H.V. COIL IS IDENTIFIED BY THE BLACK COLOUR, THE NEGATIVE ONE IS IDENTIFIED BY THE GREEN COLOUR.

### Electric characteristic

Voltage value H.V. coil  
 > 100 Volt



# ELECTRICAL SYSTEM

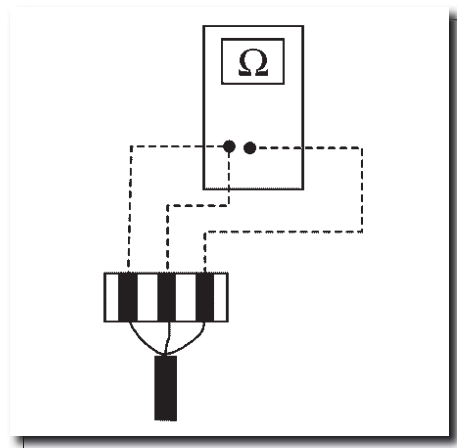
## STATOR CHECK

Disconnect the connector from the voltage regulator and check the presence of continuity between each yellow wire with the other two.

### Electric characteristic

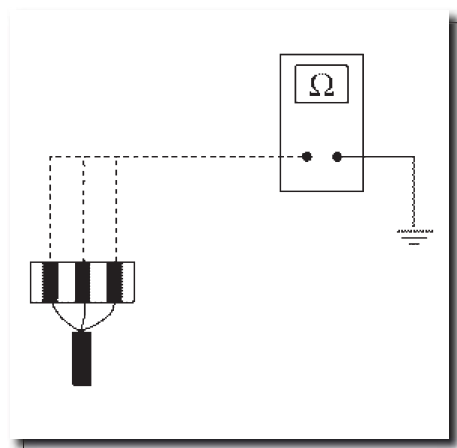
Stator check 1

Ohm value:  $0,7 \div 0,9$  Ohm



Also check that each yellow wire is insulated from earth.

If non-conforming values are detected, repeat the checks directly on the stator; in case of further wrong values, replace the stator or fix the wiring.



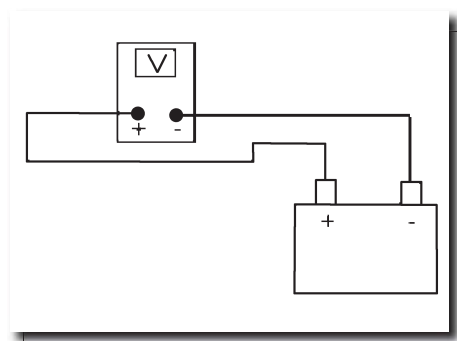
## VOLTAGE REGULATOR CHECK

With battery fully charged and lights off, measure the voltage at the battery poles with engine at high speed.

Voltage should not exceed 15.2 Volt.

In case of higher voltage, replace the regulator.

If voltage is less than 14 Volt, check the stator and its wiring.



# ELECTRICAL SYSTEM

## RECHARGE SYSTEM VOLTAGE CHECK

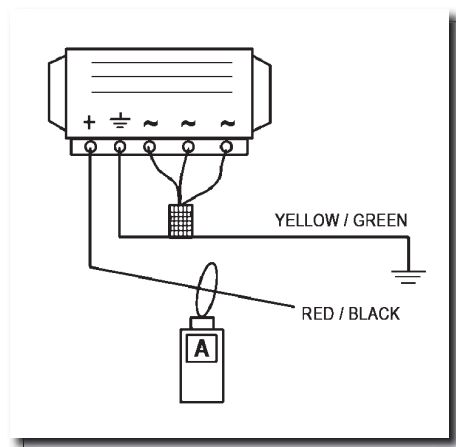
The battery recharge system consists of a three-phase generator and a permanent-magnet flywheel.

The generator is directly connected to the voltage regulator. The latter is in turn directly connected to earth and to the battery positive terminal via the 15A protection fuse (no. 7). The system is therefore not connected to the ignition key-switch.

The three-phase generator allows for considerable recharging power and, at low rpm, offers a good compromise between supplied power and idle speed stability. For this reason, it is essential that the slow running speed is adjusted as specified.

Connect an ammeter's induction clamp to the positive terminal of the voltage regulator, measure the battery voltage and, by switching the headlight on, wait until the voltage settles at approx. 12 Volts. Start the engine and measure the current supplied by the circuit with headlight on and engine at high rpm.

If the current is below 10A, repeat the test using, alternately, a new regulator and/or stator.

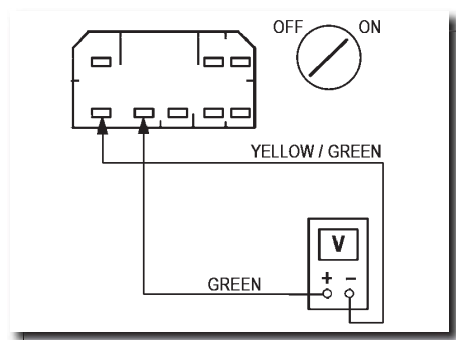
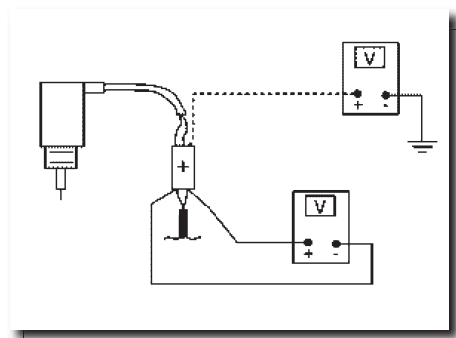


## CHOKE INSPECTION

For information on how to carry out the functional and resistive check of the component, refer the engine section of this manual. Regarding the automatic choke device power supply, keep the system connector attached and check that battery voltage is present between the two terminals, with engine running (see figure).

If there is no voltage, connect the multimeters negative terminal to earth and the positive terminal to the with the ignition switch turned onto the ON position, check for the presence of battery voltage. If no voltage is detected, check the wiring connected with the ignition switch and the two fuse 15A.

If voltage is present, repeat the check from the ignition control unit connector.





# ELECTRICAL SYSTEM

## FUSES

The electrical system is protected by a fuse located on the r.h.s. of the battery bay. To replace it, lift the seat, remove the battery access door and then the transparent fuse cover. Ignition system, headlight, and taillight are not protected by the fuses.

### CAUTION

BEFORE REPLACING THE BLOWN FUSE, TRY TO ELIMINATE THE FAULT THAT HAS CAUSED IT TO BLOW.

NEVER TRY TO REPLACE A FUSE USING DIFFERENT MATERIAL (FOR EXAMPLE A PIECE OF ELECTRIC WIRE) OR A FUSE WITH HIGHER AMPERAGE.

N°	PdC (A)	COLOUR BORN	DESCRIPTION
1	15	Red - Red	General
2	15	Red/black - Brown	Lighting
3	15	Red - Red/blue	Battery charge

## DISMANTLING THE BATTERY

### WARNING

ENSURE THAT YOU DISCONNECT THE CABLE FROM THE NEGATIVE TERMINAL FIRST.

### FILLING WITH ELECTROLYTE

### WARNING

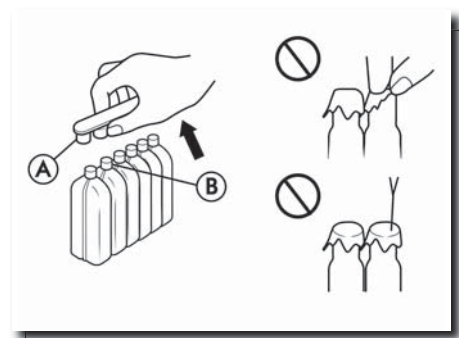
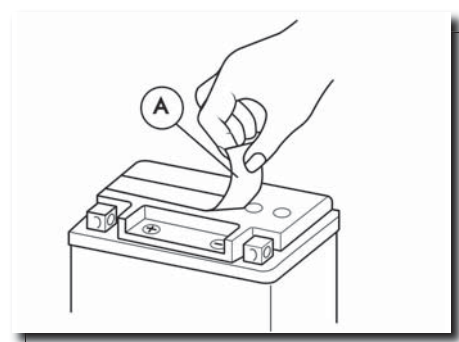
DO NOT REMOVE THE ALUMINIUM SEALING STRIP THAT SEALS THE FILLING HOLES UNTIL JUST BEFORE USING IT. THE ELECTROLYTE CONTAINER SUPPLIED WITH THE BATTERY MUST BE USED.

- Place the battery on a level surface.
- Remove the closing strip (A).
- Remove the electrolyte container from the bag.
- Detach the plug strip (A) from the container.

### NOTA

- DO NOT THROW AWAY THE PLUG STRIP AS IT WILL BE SUBSEQUENTLY USED AS BATTERY PLUGS.

- DO NOT DETACH OR PERFORATE THE HERMETIC CLOSING SURFACES (B).



# ELECTRICAL SYSTEM

- Upright the electrolyte container with the six closing surfaces aligned with the six battery filling holes.

- Push the container down with enough force to break the seals. The electrolyte should then begin to flow into the battery.

## **N.B.**

- DO NOT TILT THE CONTAINER, AS THIS MAY INTERRUPT THE FLOW OF THE ELECTROLYTE.

- MAKE SURE THAT AIR BUBBLES (A) EMERGE FROM THE SIX FILLING HOLES.

- LEAVE THE CONTAINER IN THIS POSITION FOR 30 MINUTES OR MORE.

## **N.B.**

- IF BUBBLES DO NOT EMERGE FROM THE FILLING HOLES, TAP THE BOTTOM OF THE BOTTLE (A) LIGHTLY TWO OR THREE TIMES. NEVER REMOVE THE CONTAINER FROM THE BATTERY.

## **WARNING**

REFILL THE BATTERY WITH ELECTROLYTE UNTIL THE CONTAINER HAS COMPLETELY EMPTIED.

- Make sure all the electrolyte has emptied out.

- Tap the bottom lightly as indicated above if any electrolyte has remained in the container.

- Now withdraw the container gently from the battery.

- Leave the battery standing for 30 minutes. During this period the electrolyte penetrates into the special separators and the gas generated by the chemical reaction is given off.

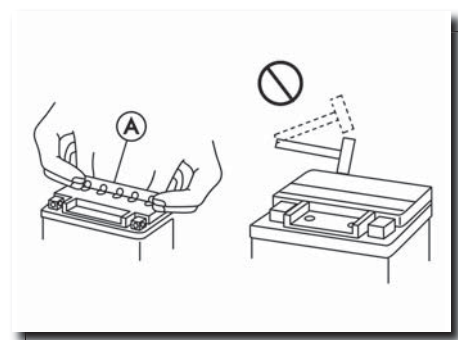
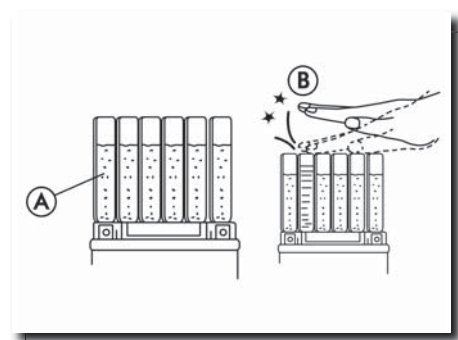
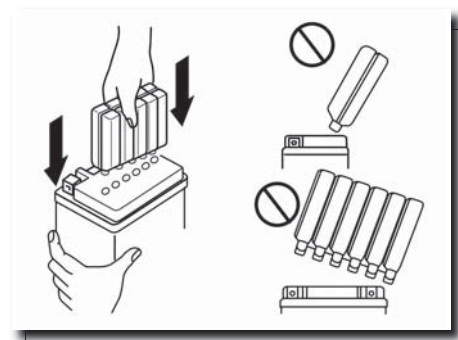
- Push the plug strip (A) firmly into place in the filling holes until the strip lies flush with the top of the battery.

## **N.B.**

- DO NOT HIT WITH A HAMMER. PRESS DOWN EVENLY WITH BOTH HANDS.

## **WARNING**

ONCE THE PLUG STRIP HAS BEEN FITTED FOLLOWING THE BATTERY FILLING, NEVER REMOVE IT OR ADD WATER TO THE ELECTROLYTE.



# ELECTRICAL SYSTEM

## BATTERY-INITIAL CHARGE

Accepting that a battery requiring no maintenance can be used only once it has been filled with electrolyte, the battery may be incapable of starting the engine in the cases indicated in the following table, where it is necessary firstly to give it an initial charge. However, if a battery shows a voltage at the terminals of over 12.5v 10 minutes after filling (Note 1), the initial charge is not necessary.

## CAPACITY

STATE THAT REQUIRES AN INITIAL CHARGE	CHARGING METHOD
At low temperatures (below 0°C)	0,4A x 2-3 hours
The battery has been stored at high temperature and humidity	0,4A x 15-20 hours
The closing strip has been removed or is broken – peeled, torn or punctured	
2 or more years have transpired since the battery was manufactured	

NOTE 1: Terminal voltage – To measure the battery terminal voltage, use a digital voltmeter.

### WARNING

**1). DOES NOT REQUIRE REFILLING.**  
WHEN USED IN A NORMAL WAY, THIS BATTERY DOES NOT REQUIRE REFILLING UNTIL THE END OF ITS LIFE. LEVERING OFF THE CLOSING STRIP TO ADD WATER IS VERY DANGEROUS. NEVER DO THIS.

### WARNING

THIS BATTERY IS DESIGNED IN SUCH A WAY THAT IT SHOULD NOT SUFFER EXCESSIVE DETERIORATION IF RECHARGED ACORDING TO THE METHOD SPECIFIED ABOVE. TAKE CARE HOWEVER, SINCE THE BATTERY'S PERFORMANCE MAY BE NOTABLY REDUCED IF CHARGED IN CONDITIONS OTHER THAN THE ABOVE.  
NEVER REMOVE THE CLOSING STRIP DURING RECHARGING.

**2). WHEN THE MOTORCYCLE IS NOT TO BE USED FOR A PERIOD OF MONTHS:**  
RECHARGE IT BEFORE STORING THE MOTORCYCLE, AND STORE IT WITH THE NEGATIVE CABLE DISCONNECTED. RECHARGE IT ON A MONTHLY BASIS DURING THE STORAGE PERIOD.

**3). BATTERY LIFE:**  
IF THE BATTERY FAILS TO START THE ENGINE EVEN AFTER VARIOUS RECHARGES, THIS MEANS THAT THE BATTERY HAS REACHED THE END OF ITS LIFE. REPLACE IT WITH A NEW ONE. (ALWAYS ASSUMING HOWEVER THAT THERE ARE NO PROBLEMS IN THE MACHINE'S STARTER SYSTEM)

# ELECTRICAL SYSTEM

## TAKE CARE

KEEP THE BATTERY AWAY FROM SPARKS OR NAKED FLAMES DURING THE CHARGING PROCESS, SINCE THE BATTERY GIVES OFF AN EXPLOSIVE MIXTURE OF HYDROGEN AND OXYGEN GASES. WHEN USING A BATTERY CHARGER, CONNECT THE CHARGER TO THE BATTERY BEFORE PLUGGING IT IN. THIS PROCEDURE PREVENTS SPARKS FROM BEING PRODUCED AT THE BATTERY TERMINALS THAT MAY IGNITE THE GASES COMING FROM THE BATTERY.

NEVER LIGHT A FIRE NEAR THE BATTERY. THE TERMINALS MUST NOT BE LOOSE.

THE ELECTROLYTE CONTAINS SULPHURIC ACID. TAKE GREAT CARE THAT THIS DOES NOT COME INTO CONTACT WITH THE SKIN OR EYES.

IF IT DOES COME INTO CONTACT WITH THESE, WASH THE AFFECTED AREA IMMEDIATELY WITH AN ABUNDANT AMOUNT OF WATER. IF THE CONDITION IS SERIOUS, GET MEDICAL ATTENTION.

## INTERCHANGEABILITY

A BATTERY THAT DOES NOT REQUIRE MAINTENANCE CAN ONLY GIVE ITS BEST PERFORMANCE IN COMBINATION WITH THE ELECTRICAL SYSTEM OF THE CORRECT MACHINE. THEREFORE ONLY FIT A MAINTENANCE-FREE BATTERY ON A MOTORCYCLE THAT WAS ORIGINALLY FITTED WITH A MAINTENANCE-FREE BATTERY.

TAKE CARE, SINCE FITTING A MAINTENANCE-FREE BATTERY ON A MOTORCYCLE WITH A NORMAL BATTERY AS ORIGINAL EQUIPMENT WILL RESULT IN THE LIFE OF THE MAINTENANCE-FREE BATTERY BEING SHORTENED.

## INSPECTING THE CHARGING CONDITIONS

Battery charging conditions can be checked by measuring the voltage at the battery terminals.

- Remove the seats (see Chassis chapter).
- Disconnect the cables from the battery.

## WARNING

ENSURE THAT YOU DISCONNECT THE CABLE FROM THE NEGATIVE TERMINAL FIRST.

ENSURE THAT YOU DISCONNECT THE CABLE FROM THE NEGATIVE TERMINAL FIRST.



# ELECTRICAL SYSTEM

## N.B.

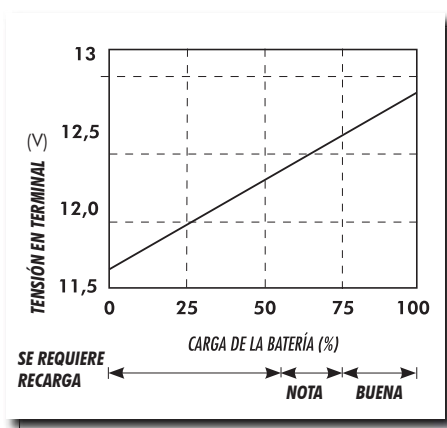
CARRY OUT THE MEASUREMENT WITH A DIGITAL VOLT-METER (A) THAT CAN READ VOLTAGES WITH DECIMAL FIGURES.

\* IF THE READING IS BELOW THAT SPECIFIED, THE BATTERY NEEDS TO BE RECHARGED.

### Battery terminal voltage

**Standard:** 12.5v or higher

- Measure the voltage at the battery terminals.



## RECHARGING

- Disconnect the cables from the battery terminals (see inspecting the charging conditions).
- Remove the battery (A).
- Carry out the recharging by following the method, and according to the voltage at the battery terminals.

## WARNING

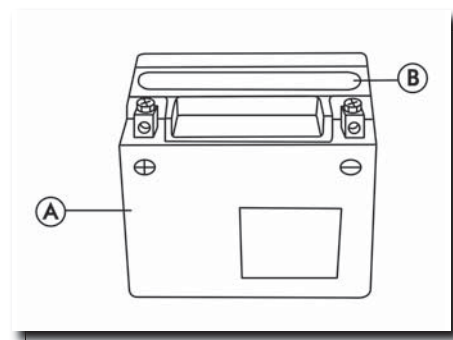
THIS BATTERY IS THE HERMETIC (AIRTIGHT) TYPE. NEVER REMOVE THE CLOSING PLUGS (B), NOT EVEN WHEN CHARGING. NEVER ADD WATER.

CARRY OUT THE CHARGING WITH THE CURRENT AND FOR THE PERIOD INDICATED BELOW.

**Battery terminal voltage:** 11.5 – Less than 12.5V

**Standard charge:**

0.4A x 5 - 10h (see the graph on the following page)



# ELECTRICAL SYSTEM

## CHARGING SYSTEM

- A charger with a constant intensity and voltage needs to be used.

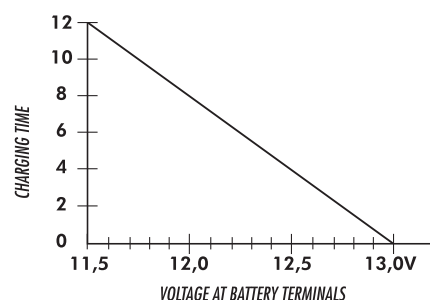
**STANDARD CHARGE: 0.38AH FOR 10 HOURS IF THE VOLTAGE IS BELOW 12.5V.**

- Carry out charging using the enclosed table.

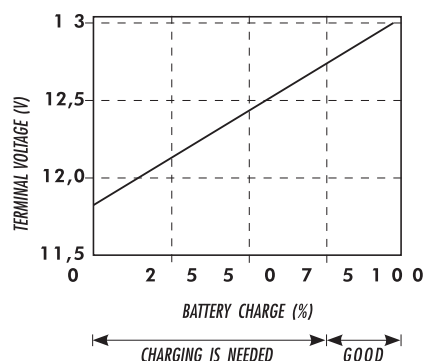
**STANDARD VALUES TO DETERMINE THE STATE OF THE BATTERY.**

Voltage of 12.5v or higher	Correct
Voltage from 12.0 to 12.4	Insufficient charge. Charge up.
Voltage of 11.9 or less	Unusable (Replace)

**STANDARD BATTERY CHARGING TIME.**



**MONITORING GRAPH TO DETERMINE BATTERY CONDITION**



# DERBI

## TROUBLESHOOTING

### ENGINE

#### POOR PERFORMANCE

POSSIBLE CAUSE	WORK
Dirty-carburettor; feeding pump or vacuum cock failure	Remove, wash with solvent, dry with compressed air or replace.
Excessive scaling in the explosion chamber	Remove the scale from cylinder, piston, head and valves.
Wrong timing or worn timing components	Restore the timing or replace worn parts.
Clogged silencer	Replace.
Air filter clogged or dirty	Remove the sponge, wash with water and shampoo, then impregnate it in a 50% mixture of fuel and specific oil, then press it without squeezing, let it drip and replace it.
Automatic starter failure	Check: mechanical sliding, electric connection and presence of power supply, replace if required.
Engine oil level exceeding the maximum	Check the causes and restore the correct level.
Low compression: wear of linings, cylinder and valve	Replace worn parts.
Worn driving belt	Replace.
Inefficient automatic transmission	Check the pulley sliding and rollers, replace faulty components, lubricate the mobile driven pulley guide with grease specific.
Clutch slipping	Check and replace the clutch unit and/or the bell, if required.
Overheated valves	Remove the head and the valves, grind or replace the valves.
Incorrect valve adjustment	Adjust the valve clearance.
Valve seat deformed	Replace the head unit.
Dirty air filter	Remove the sponge, wash with water and shampoo, then impregnate it in a 50% mixture of fuel and specific oil, then press it without squeezing, let it drip and replace it.
Defective float valve	Check the proper sliding of the float and the valve efficiency.



# TROUBLESHOOTING

## REAR WHEEL TURNING WITH IDLE ENGINE

POSSIBLE CAUSE	WORK
Idle rpm too high	Adjust the engine idle speed and the CO%, if required.
Clutch failure	Check clutch springs / masses

## STARTING DIFFICULTIES

POSSIBLE CAUSE	WORK
Altered fuel characteristics	Drain altered fuel and refuel.
Start up speed too low or starter system and motor failure	Check the starter motor, the system and the torque limiter.
Incorrect valve seal or wrong valve adjustment	Inspect the head and/or set the correct clearance.
Flooded engine	Start up keeping the gas fully open. If the engine won't start, remove the spark plug, dry it and before replacing it, start the engine to eject the excess of fuel, keeping the cap connected to the spark plug and the latter to earth. If fuel has finished; refuel and start up.
Automatic starter failure	<b>Check:</b> mechanical sliding, electric connection and presence of power supply, replace if required.
Air filter clogged or dirty	Remove the sponge, wash with water and shampoo, then impregnate it in a 50% mixture of fuel and specific oil, then press it without squeezing, let it drip and replace it.
Faulty spark plug or incorrect ignition advance	Replace the spark plug or check the ignition circuit components
Dirty carburettor; feeding pump or vacuum cock failure	Remove, wash with solvent, dry with compressed air or replace
Flat battery	Check the battery charge level, in case of traces of sulphation, replace and start the new battery as instructed in section 4-13
Cracked intake union or strips not tightened properly	Replace the intake union and check the strip tightening

# DERBI

## TROUBLESHOOTING

### STARTING DIFFICULTIES

POSSIBLE CAUSE	WORK
Defective float valve	Check the proper sliding of the float and the valve efficiency
Carburettor nozzles clogged	Remove, wash with solvent, dry with compressed air

### EXCESSIVE OIL CONSUMPTION / SMOKE UPON EXHAUST

POSSIBLE CAUSE	WORK
Worn valve guides	Check and replace the head unit if required
Worn valve oil guard	Replace the valve oil guard
Oil leaks from the couplings or from the gaskets	Check and replace the gaskets or restore the coupling seal
Worn or broken piston rings, or mounted incorrectly	Replace the piston rings or the cylinder unit

### INSUFFICIENT LUBRICATION PRESSURE

POSSIBLE CAUSE	WORK
By-Pass remains open.	Check the By-Pass and replace if required. Carefully clean the By-Pass area
Oil pump with excessive clearance	Perform the dimensional checks on the oil pump components
Oil filter too dirty	Replace the cartridge filter
Oil level too low	Restore the level using the recommended oil type

# TROUBLESHOOTING

## ENGINE TENDS TO CUT-OFF AT FULL THROTTLE

### THE ENGINE TENDS TO STOP AT MAX GAS OPENING

POSSIBLE CAUSE	WORK
Defective feeding circuit	Check the feeding pump, the vacuum inlet, and the duct seal, replace if required.
Incorrect float level	Restore the level in the basin by bending The fuel inlet pin thrusting reed on the float so as to have the float parallel to the basin plane with upturned carburettor.
Water in the carburettor	Empty the basin by the special drain.
Maximum jet dirty - lean carburetion	Wash with solvent and dry with compressed air.

## ENGINE TENDS TO CUT-OFF AT IDLE

### THE ENGINE TENDS TO STOP AT IDLE

POSSIBLE CAUSE	WORK
Wrong timing	Adjust the timing and check the timing components.
Cut-off device failure	Check the efficiency of the valve, membrane, spring, and the cleaning of the sponge filter.
Idle adjustment is incorrect	Adjust with the rpm counter.
Compression end pressure too low	Check the seals of the thermal unit and replace worn components.
Faulty spark plug or incorrect ignition advance.	Replace the spark plug or check the ignition circuit components
Starter remains pressed	<b>Check:</b> electric connections, circuit continuity, mechanical sliding, and presence of power; replace, if required
Idle nozzle dirty	Wash with solvent and dry with compressed air

# DERBI

## TROUBLESHOOTING

### HIGH FUEL CONSUMPTION

#### HIGH CONSUMPTION

POSSIBLE CAUSE	WORK
Float level	Restore the level in the basin by bending the fuel inlet pin thrusting reed on the float so as to have the float parallel to the basin plane with upturned carburettor.
Slackened nozzles	Check the maximum and minimum nozzle locking into their seat
Fuel pump failure	Check that there is no fuel in the vacuum duct.
Inefficient starter	Check: electric connections, circuit continuity, mechanical sliding, and presence of power
Air filter clogged or dirty	Remove the sponge, wash with water and shampoo, then impregnate it in a 50% mixture of fuel and specific oil, then press it without squeezing, let it drip and replace it.

### EXCESSIVE EXHAUST NOISE

#### EXCESSIVE NOISE WITH EXHAUST

POSSIBLE CAUSE	WORK
Cut-off valve of the secondary air device does not work	Replace the secondary air device
Pressure inlet pipe from the secondary air device disconnected or cracked	Replace the pipe
Reed valve of the secondary air device does not close properly and deteriorates the rubber coupling between the device and the head pipe.	Replace the device and coupling

# TROUBLESHOOTING

## SAS MALFUNCTIONS

### SECONDARY AIR DEVICE ANOMALIES

POSSIBLE CAUSE	WORK
Cutoff valve of the secondary air device not working	Replace the secondary air device
Vacuum inlet pipe from the secondary air device disconnected or cracked	Replace the pipe
Reed valve of the secondary air device does not close properly and deteriorates the rubber sleeve between device and head pipe.	Replace device and sleeve.

## TRANSMISSION AND BRAKES

### CLUTCH GRABBING OR PERFORMING INADEQUATELY

POSSIBLE CAUSE	WORK
Faulty clutch	Check that the masses are free from grease. Check that the contact surface of the clutch masses with the bell is mainly in the centre and with the same features on the three masses. Check that the clutch bell exhibits no abnormal wear or scratches.

## INSUFFICIENT BRAKING

### BRAKING SYSTEM

POSSIBLE CAUSE	WORK
Fluid leaks from the hydraulic braking system	Check the pad wear (1.5 mm MrN). Make sure the brake disc is not worn, scratched or deformed. Make sure the fluid level in the pump is correct and change the brake fluid if necessary. Make sure there is no air in the circuit and bleed if necessary. Make sure the front brake caliper moves in line with the disc.
Coolant leaking from the hydraulic brake circuit	Flexible connections, piston or brake pump gaskets faulty. Replace

# DERBI

## TROUBLESHOOTING

### BRAKES OVERHEATING

POSSIBLE CAUSE	WORK
Rubber gaskets expanded or sealed	Replace the gaskets.
Pump compensation holes clogged	Clean carefully and blow with compressed air.
Brake disc slackened or deformed	Check the tightening of the brake disc screws; measure the disc axial deviation using a comparator and keeping the wheel mounted on the vehicle.
Defective piston sliding	Check the caliper and replace any damaged parts.

### BRAKING VIBRATIONS OR NOISE

#### VIBRATIONS OR REFRAINED NOISINESS

POSSIBLE CAUSE	WORK
Brake disc slackened or deformed	Check the tightening of the brake disc screws; measure the disc axial deviation using a comparator and keeping the wheel mounted on the vehicle.

### ELECTRICAL SYSTEM

#### BATTERY

POSSIBLE CAUSE	WORK
Battery	<p>This is the system device that requires the most assiduous surveillance and the most diligent maintenance.</p> <p>If the vehicle is not used for a certain period (1 month and more), the battery needs periodical recharging. The battery tends to go completely flat within around 3 months. When reinstalling the battery on the motor cycle, be careful not to invert connections, considering that the black earth wire must be connected to the negative terminal, whereas the other red wire must be connected to the terminal marked with + sign.</p>

# TROUBLESHOOTING

## TURN SIGNAL LIGHTS MALFUNCTION

### FLASHING LIGHTS NOT WORKING

POSSIBLE CAUSE	WORK
Electronic ignition device failure.	With the key switch set to «ON» connect the jumpers 1 (Blue-Black) and 5 (Red/Blue) on the control unit connector. If lights do not turn on and remain solid when the flashing light control is actuated, replace the control unit, otherwise check the wiring and the switch.

## STEERING AND SUSPENSIONS

### HEAVY STEERING

#### HARDENING STEERING

POSSIBLE CAUSE	WORK
Excessive steering wheel clearance	Check the tightening of the top and bottom ring nut. If the anomaly continues during the steering wheel rotation even after the adjustment, check the bearing ball rolling seats. If they are recessed or if the balls are squashed, replace.

#### EXCESSIVE STEERING PLAY

POSSIBLE CAUSE	WORK
Steering wheel difficult to operate	Check the tightening of the top and bottom ring nut. If the anomaly continues during the steering wheel rotation even after the adjustment, check the bearing ball rolling seats. If they are recessed or if the balls are squashed, replace.





# TROUBLESHOOTING

## NOISY SUSPENSION

POSSIBLE CAUSE	WORK
Noisy suspension	If the front suspension is noisy, check: the front shock absorber efficacy, the condition of the ball bearings and the relevant locking nuts; the travel end rubber pads and the sliding bushes. Finally, check the tightening torques of the wheel hub, brake caliper, disc and shock absorber in the connection to the hub and to the steering tube.

## SUSPENSION OIL LEAKAGE

POSSIBLE CAUSE	WORK
Suspension oil leaking	Replace the shock absorber. Check the wear of the steering wheel caps and the adjustments.



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